EXHIBIT C

Analysis of SAP TN's Collection and Use of
Oracle Software and Related Materials

November 16, 2009,

supplemented February 12, 2010

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INTELLIGENT INFORMATION SECURITY

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A.   INITIAL REPORT

1.   I, Kevin Mandia, submit the following expert report in the case Oracle USA, Inc., *et al.*, v. SAP AG, *et al.*, Civil Action Number 07-CV-1658, in the U.S. District Court for the Northern District of California, Oakland Division. This report has been supplemented to account for additional fact discovery received on or after November 1, 2009. I have been advised that pertinent fact discovery in this case is still outstanding, pursuant to a motion to compel. Furthermore, I understand that the expert discovery period extends until June 18, 2010, and that Defendants may be serving rebuttal reports on or before March 26, 2010.   Accordingly, I reserve the right to modify or supplement this disclosure, or simply consider new information, if and when more information is made available to me, including both factual discovery and information provided by the experts for Defendants SAP AG, SAP America, Inc., (together, "SAP") and TomorrowNow, Inc. ("SAP TN," and together with SAP, "Defendants").

2.   I have been asked by Plaintiffs Oracle USA, Inc., *et al.* ("Oracle") to render my opinions regarding the means and methods by which SAP TN accessed and downloaded from Oracle's customer support websites, as well as the nature and extent of SAP TN's copying, modification, distribution, and use of Oracle intellectual property to support SAP TN's customers.

3.   As a result of extensive analysis and investigation by Mandiant, I have reached five overall opinions. Below I provide a detailed summary of my findings, based on analysis and corroborated by testimony.[1]

4.   First, SAP TN's service model relied on mass downloading from and improper access to Oracle systems. A review of Oracle log files revealed SAP TN connected to Oracle servers and downloaded at least 992,420 files from September 1, 2006 through May 8, 2008. A review of SAP TN systems revealed additional downloads totaling over 9 million files related to Oracle Software and related support materials (SSMs). On several occasions, SAP TN connected to Oracle support websites over 600,000 times in a single day. In fact, SAP TN created specialized software, called Titan, to ensure the most expeditious collection of Oracle SSMs. SAP TN used this tool for data collection without regard for customer credentials or customer licenses.[2]

5.   SAP TN used improper credentials and false pretexts to access Oracle support websites. SAP TN accessed Oracle support websites using a pool of credentials provided by third parties, and downloaded Oracle materials without regard to licensing. For example, a limited review of Oracle's log files and Data Warehouse for five SAP TN customers identified over 20,000 files downloaded for these customers for which they had no license. In other words, SAP TN used virtually any working credentials to download files indiscriminately.

6.   SAP TN then copied, distributed, modified and used these downloaded Oracle Software and related support materials in numerous ways, including to support customers beyond

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[1] Mandiant has considered numerous evidentiary sources and other materials in performing the analysis and reaching the conclusions described in this report. A list of all such materials is provided in the attached Appendix and electronic appendices. To the extent such materials have not already been produced by or to Defendants in this matter, Mandiant is producing these materials in electronic form with this report. Many of the materials being produced are explicitly referenced in this report, in which case the report cites to a Bates-number assigned to a folder in the directory structure of the media being produced and which contains the referenced information.

[2] Certain capitalized terms in these Conclusions are defined below in Section IV.

the ones whose credentials SAP TN used to perform the downloads. I have compared these downloaded Oracle Software and Support Materials to Oracle's Registered Works, and conclude that over 1 million files found on SAP TN's servers contain material protected by the copyrights Oracle asserts in this action.

7.   Second, SAP TN made thousands of full or partial copies of Oracle Enterprise Application and Database Software from Install Media throughout the course of providing support to its customers, particularly relating to the PeopleSoft HRMS product line. Mandiant performed extensive analysis of the SAP TN Data Warehouse and other sources to confirm the identity and number of copies of Oracle software on the SAP TN computer systems, including PeopleSoft, JD Edwards, Siebel, and Database Software. Based on this analysis, the extent of copying, and my understanding that large portions of these copies constitute protected expression, I conclude that these copies contain material protected by the copyrights Oracle asserts in this action.

8.   Third, SAP TN Fixes delivered by SAP TN to its customers were Contaminated and resulted from Cross-Use of Environments and downloads of Oracle SSMs from other customers. To reach this conclusion, Mandiant analyzed how SAP TN copied and modified certain objects from the Oracle SSMs to deliver support to its customers. In conducting this analysis, Mandiant focused on the PeopleSoft HRMS product line, which represented over 90% of the Fixes and a similar percentage of the Local Environments that Mandiant could identify on SAP TN's computer systems.

9.   Due to the volume of copying, modification, and distribution of code involved in SAP TN's support model, Mandiant also worked with Oracle's statistical experts, Advanced Analytical Consulting Group, to sample and analyze over 1000 Fixes to establish the extent SAP TN delivered PeopleSoft HRMS payroll fixes via Cross-Use of software copies that originated from a different customer. Our analysis revealed for approximately 90% of the Fixes it delivered to its customers, SAP TN failed to create that Fix using only the software from that customer.

10.   As an example, our analysis of CSS-TN-1116067702 found that there were 3612 copies of files associated with this Fix, that 58 customers received the Fix, that 30 Environments were used in creation of the Fix, and that 100% of the deliverables received by the 58 customers were Contaminated by Cross-Use of customer-labeled Environments or Cross-Use of "Generic" Environments.

11.   Mandiant also determined that over 98% of the clients receiving a Fix involving a data change received the change from a Generic or incorrect customer Environment.

12.   These deliverables contain large amounts of material protected by the copyrights Oracle asserts in this action, and these deliverables modified Oracle software that is likewise protected by the copyrights Oracle asserts in this action.

13.   Fourth, SAP TN continued to rely on access, downloading, copying, modification, and distribution of Oracle Enterprise Application Software and SSMs for over a year and a half after Oracle sued in this Action. Mandiant analyzed SAP TN's computer systems for further copies of Oracle Enterprise Application Software and SSMs after March 22, 2007. Those further copies, in addition to testimony, show that SAP TN did not discontinue those aspects of its support business model to avoid further copying, modification, and distribution of Oracle software.

14.   Fifth, SAP TN copied, downloaded, modified, distributed, and used a significant amount of material protected by the copyrights Oracle asserts in this action. The files comprising

SAP TN's Fixes were maintained on its computers and were delivered to their customers. The Environments containing these Fixes were also maintained by SAP TN.

15.   Mandiant searched the SAP TN infrastructure and identified significant copies of Objects and SSMs that Oracle asserts are protected by its copyrights. It is Mandiant's understanding that these Objects are Protected Expressions subject to copyright. It is also Mandiant's understanding that Environments updated with Fixes constitute Derivative Works. Therefore, I conclude that SAP TN downloaded, modified, distributed and used a significant amount of material protected by the copyrights Oracle asserts in this action.

16.   In summary, I have concluded that SAP TN's support of Oracle's products relied on the access to and copying of Oracle materials through:

- Mass downloading of and improper access to Oracle SSMs from Oracle's customer support websites
- Creation of copies of Oracle SSMs
- Creation of thousands of copies of Oracle Enterprise Application and Database Software
- Cross-Use of Oracle Enterprise Application Software and/or SSMs to develop and deliver virtually every Fix SAP TN provided to customers
- Continuing access, downloading, copying, modification, and distribution of Oracle Enterprise Application Software, SSMs, and support websites for over a year and a half after Oracle sued in this Action
- Oracle's copyrights asserted in this Action protect the Oracle Enterprise Application and Database Software and SSMs that SAP TN copied, downloaded, modified, distributed, and used to create Fixes and for other commercial purposes to support its business model.

B.   SUPPLEMENTAL REPORT

17.   Mandiant continues to receive new and additional data productions as part of the ongoing discovery process. The supplemental material in this report addresses the emerging information Mandiant has considered since its initial report dated November 16, 2009. Specifically, Mandiant has considered the Data Warehouse materials, depositions, written responses and other materials listed in Tables A through D below. Mandiant understands that all of these materials were first produced by Defendants on or after November 1, 2009.

Date of Production	Images Produced	Drives Produced
11/12/2009	TN-DCPSDB01	TN-HD112-a
12/1/2009	PSDEV02_D01, PSDEV02_D02, PSDEV02_D03, HOMER	Disc 319 (HOMER), TN-HD116 (3 Partitions of PSDEV02)
1/8/2010	PSNT01_C, PSNT01_F, 24 Siebel virtual machines recollected from TN-FS01_F	TN-HD119

Table A: Data Warehouse Images First Addressed in Supplemental Report

Date of Deposition	Deponent
November 18, 2009	Wanda Jones
November 20, 2009	Jeff Buehrle
December 1, 2009	Jerry Jin

Date of Deposition	Deponent
December 2, 2009	John Ritchie
December 3, 2009	John Baugh
December 3, 2009	Greg Nelson
December 4, 2009	William Thomas

Table B: Depositions First Addressed in Supplemental Report

Date	Written Response
November 11, 2009	Defendants' Responses and Objections to Plaintiffs' Fifth Set of Interrogatories to Defendant Tomorrow Now, Inc., and Fourth Set of Interrogatories to Defendants SAP America, Inc. and SAP AG
November 11, 2009	Defendant TomorrowNow, Inc.,'s Fifth Amended and Supplemental Responses and Objections to Plaintiff Oracle Corp.'s Third Set of Interrogatories and Defendants SAP America, Inc.'s and SAP AG's Fourth Amended and Supplemental Responses and Objections to Plaintiff Oracle Corp.'s Second Set of Interrogatories
November 11, 2009	Defendants' Responses and Objections to Plaintiffs' Fourth Set of Requests for Admission
November 23, 2009	Defendants' Responses and Objections to Plaintiffs' Fifth Set of Requests for Admission
December 4, 2009	Defendant TomorrowNow, Inc.,'s Sixth Amended and Supplemental Responses and Objections to Plaintiff Oracle Corp.'s Third Set of Interrogatories and Defendants SAP America, Inc.'s and SAP AG's Fifth Amended and Supplemental Responses and Objections to Plaintiff Oracle Corp.'s Second Set of Interrogatories
December 4, 2009	Defendants' Seventh Amended and Supplemental Responses and Objections to Plaintiffs' Fourth Set of Interrogatories to Defendant Tomorrow Now, Inc., and Third Set of Interrogatories to Defendants SAP America, Inc. and SAP AG
December 4, 2009	Defendant TomorrowNow, Inc.,'s Eighth Amended and Supplemental Responses and Objections to Plaintiff Oracle Corp.'s First Set Of Interrogatories
December 4, 2009	Defendants' First Supplemental Responses and Objections to Plaintiffs' Fifth Set of Interrogatories to Defendant Tomorrow Now, Inc., and Fourth Set of Interrogatories to Defendants SAP America, Inc. and SAP AG
December 4, 2009	Defendants' Second Amended and Supplemental Responses and Objections to Plaintiffs' Third Set of Requests for Admission
December 4, 2009	Defendant TomorrowNow, Inc.'s Eighth Amended and Supplemental Responses and Objections to Plaintiff Oracle Corp.'s First Set Of Interrogatories

Table C: Written Responses First Addressed in Supplemental Report

Date of Production	Material Considered
November 24, 2009	Merrill Legal Solutions index of the contents of the CD Binders
November 25, 2009	Custodial production of Anthony Cefola
November 25, 2009	Custodial production of Michael Jahrsdoefer
November 25, 2009	Custodial production of Chandra Muvvala
December 3, 2009	Custodial production of Aaron Phillips

Table D: Other Materials First Addressed in Supplemental Report

18.   Furthermore, Mandiant's review of the materials listed in Tables A through D led Mandiant to re-examine certain materials that Mandiant understands to have been produced or otherwise made available before November 1, 2009:

Date	Material Considered
October 27, 2009	Merrill Corp.'s Coding Manual for Bingham McCutchen LLP & Jones Day. Oracle v. SAP
December 4-5, 2008	Deposition of Uwe Koehler, December 4-5, 2008

Table E: Other Materials

19.   Upon review of the materials listed above, Mandiant identified new factual support for our previous findings.

20.   Mandiant identified 103 additional PeopleSoft local environments and 60 additional backups of PeopleSoft local environments on DCPSDB01, PSDEV02 and PSNT01. Mandiant performed both database comparisons and file-based object comparisons to demonstrate that these environments resulted from installations of Oracle Enterprise Application Software.

21.   Mandiant identified six additional copies of Oracle Database Install Media and two additional installations of Oracle Databases on PSDEV02 and DCPSDB01.

22.   Mandiant identified 310,702 additional downloaded Siebel SSMs. Mandiant estimates 10,099 of these files matched the Siebel Automated Databases and are Registered Works.

23.   Mandiant considered testimony and analyzed source code and log information relating to Titan, and determined that SAP TN's development, testing and use of Titan impeded the performance of Customer Connection, and more than likely impacted the availability of Customer Connection to Oracle's paying customers.

24.   Mandiant identified 757 copies of Install Media for Oracle Enterprise Application Software and Oracle Database in SAP TN's CD Binders.

25.   Finally, Mandiant understands that the Court has required Defendants to further supplement their responses to Plaintiffs' Second, Third and Fifth Sets of Requests for Admission. Mandiant reserves the right to further supplement its report and/or opinions based on Defendants' expected supplemental responses.

II.   EXPERIENCE AND COMPENSATION

26.   I am the President and Founder of Mandiant Corporation ("Mandiant"). Mandiant is a professional services and software company. Mandiant specializes in performing computer forensics and high technology investigations. Mandiant has also developed software, called Mandiant Intelligent Response (MIR), as an Enterprise-Grade electronic evidence collection and analysis tool. Mandiant employs nearly 100 consultants and engineers who specialize in investigating high-technology crimes such as theft of intellectual property and computer intrusions. The majority of Mandiant's consultants maintain a government clearance of Top Secret (TS) or higher, and were prior special agents and counterintelligence officers for the United States government.

27.   I have been employed as a Professorial Lecturer at both Carnegie Mellon University as well as The George Washington University (GWU). At both schools, I taught Graduate programs in computer forensics and high technology investigations. At GWU, I taught their most advanced computer forensics class from 2004 through 2008. I have taught and continue to teach Special Agents employed by the Federal Bureau of Investigation and the United States Secret Service on computer forensics and high technology investigations. I have also taught for the U.S. Department of Justice, creating and delivering specialized courses for the Assistant US Attorneys that specialize in computer crime cases.

28.   I formally studied computer science, as well as forensics science, to blend technical acumen with proper evidence collection, review, and interpretation. I received my B.S. in Computer Science at Lafayette College. I received my M.S. in Forensic Science from The George Washington University.

29.   I am the principal architect of Mandiant's patent-pending proprietary software tools. In that capacity, I supervise a software development team of approximately 20 people. Mandiant's software is written in multiple programming languages and incorporates components and modules that I designed.

30.   Based on my formal studies, my experience designing and supervising the development of software, and my experience in computer forensics and related investigations, I have an in-depth understanding of computer programming, databases, and enterprise level information technology.

31.   I have over 15 years of computer security and technical investigations experience. During this time, I have investigated unauthorized access, theft of intellectual property, computer intrusions, and other computer crimes as both a Federal Agent with the United States Air Force as well as a consultant. I have supported the FBI on dozens of investigations, including the theft of intellectual property, unauthorized access, counterintelligence and national security cases. I maintain a TS clearance, and continue to support the Government in sensitive investigations that require computer forensics, and computer security expertise. I have testified as a computer forensics expert in Federal Criminal Court on 4 separate occasions, and I have testified for an International Tribunal on 1 occasion. My investigations include:

Theft of Intellectual Property

I have provided expert support for economic espionage investigations as well as theft of intellectual property cases. I have worked on cases that involved the comparison of registered, original computer programming source code with alleged stolen source code. When comparing source code, I used commonly accepted tools and methods such as

MD5 hashing, "diff" comparisons, and used databases to perform extensive data analysis to support the case.

Unlawful and Unauthorized Access

I have worked on dozens of investigations into unlawful or unauthorized access into computer systems on behalf of the U.S. Government as well as the victim organizations, insurance companies, or legal counsel.

Computer Forensics

I have been hired to provide opinions on many matters, including but not limited to the following:

- Whether financial databases were tampered with or not
- Whether personally identifiable information (PII) or intellectual property (IP) was compromised in a data security breach
- What a computer was primarily used for
- Whether a user possessed or disseminated electronic files or documents
- If a specific file was ever printed
- Whether a user wiped a drive or a file
- If web-based email accounts were used (*e.g.*, Hotmail)
- If intentional deletion of materials occurred
- Whether or not external media devices were used
- What files were copied to the USB or remote media
- Whether a system was compromised or not

32. A copy of my resume setting forth my background and qualifications is attached as Attachment A. My testimonial experience within the preceding four years is attached as Attachment B. A list of all publications authored (or co-authored) by me within the preceding ten years is set forth in Attachment C. I have been retained by Bingham McCutchen LLP on behalf of Oracle. My agreed compensation for work in this matter, including deposition and trial testimony, has ranged from $360 to $400 per hour. My compensation is in no way contingent on the substance of my opinions and conclusions.

III. ASSIGNMENT AND METHODOLOGY

33.   I have been hired on behalf of Oracle to investigate and provide analysis and testimony in this litigation on the following topics:

- SAP TN's access to Oracle's support websites
- SAP TN's copying, modification, distribution, and further use of SSMs downloaded from Oracle's support websites
- A comparison between the Oracle SSMs obtained by SAP TN and Oracle's Registered Works asserted in this Action
- SAP TN's receipt, copying, modification, distribution, and further use of Oracle Enterprise Application and Database Software
- A comparison between Oracle Enterprise Application and Database Software and Oracle's Registered Works asserted in this Action
- Analysis of SAP TN's method for providing support using Oracle Enterprise Application Software and SSMs

34.   My investigation included standard forensic techniques and methodologies, in addition to an extensive review of produced documents and testimony. Various methodologies employed are referenced and explained throughout this report and at length in the Appendices to the report. A brief summary of the primary forensic methodologies is attached as Appendix A.

IV. ASSUMPTIONS AND DEFINITIONS

A. ASSUMPTIONS

1. Derivative Works

35.   The following represent my assumptions for Derivative Works:

- File-based Objects and Online Objects incorporate a substantial amount of Protected Expression.
- Modification of a File-based Object substantially transforms the File-based Object.
- A File-based Object applied to an Environment substantially transforms that Environment.
- A DAT file applied to an Environment substantially transforms that Environment.
- The Database Schema incorporates a substantial amount of Protected Expression.
- Modification to the Database Schema substantially transforms that Database.

2. Distribution

36.   Any Fix found on Delivered Updates and Fixes associated with a customer's three-letter acronym was delivered to that customer.

3. Environments

37.   Environments include any installation of Oracle Enterprise Application Software. Where an Environment comprises multiple components, such as a PS_HOME in the case of PeopleSoft Enterprise Application Software, the presence of some or all components constitutes an Environment.

4. Improper Activity

38.   Use of existing Oracle Enterprise Application Software, Oracle Database Software, or Oracle SSMs provided by one customer to create instructions by which another customer can implement its own Fix to Oracle Enterprise Application Software or Oracle Database Software is improper.

39.   Fixes developed and delivered to a customer should only be developed, tested, and produced using that customer's licensed Oracle software.

40.   Even if an Environment assigned to a specific customer was used for all stages of Fix-delivery for that customer's Fix, the Fix is Contaminated if that Environment was also used to support other customers as part of the Fix-delivery process for that same Fix ID.

5. Install Media

41.   Every successful installation of Oracle Enterprise Application Software or Database Software from Install Media[3] listed creates a copy of the associated Oracle Enterprise

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[3] A complete list of Oracle software that embodies the Registered Works, by Bates number, can be found in the appendices to Plaintiffs' Responses to Defendants' Interrogatory 13, including amended and supplemental responses.

Application Software or Database Software, and the Protectable Expression contained in the Oracle Enterprise Application Software or Database Software.

42.   Every copy of Install Media for Oracle Enterprise Application Software or Oracle Database Software is a copy of the associated Oracle Enterprise Application Software or Oracle Database Software, and the Protectable Expression contained in the Oracle Enterprise Application Software or Oracle Database Software.

6.   PeopleSoft Environments

43.   A PeopleSoft Environment typically consists of one or more of a PeopleSoft base application (such as HRMS), PeopleTools, and a PeopleSoft Database.

7.   Protected Expression

44.   Oracle Enterprise Application Software, Oracle Database Software, and certain SSMs contain a substantial amount of Protected Expression. In particular, File-based Objects and schema contain a substantial amount of Protected Expression and DAT files may contain a substantial amount of Protected Expression.

45.   Any materials described by tables 35 or 36 in Section X embody one or more Registered Works identified in paragraph 158 of the Fourth Amended Complaint.

8.   Terms of Use

46.   Oracle's customer support website terms of use generally do not allow a customer, including a third party using that customer's log-in credential, to (1) download customer support materials after the customer's maintenance end date; (2) download customer support materials for a different customer; (3) subsequently use downloaded customer support materials for a different customer; or (4) use a customer login credential other than to download licensed customer support materials solely for the use of the customer whose login credentials were used for the download(s).

47.   Oracle's customer support website terms of use incorporate the terms of the relevant license agreements and also restrict access to only customers and/or agents acting on behalf of a customer.

B.   DEFINITIONS

48.   "Additional-Customer Contamination" means that a Fix intended for or delivered to one customer is generated using Oracle Enterprise Application Software, Oracle Database Software, or SSMs that are licensed to that customer but were Cross-Used to support an additional customer.

49.   "Associated Files" means any file that is a component of a specific Fix.

50.   "BakTrak" is one of SAP TN's tracking systems for the creation, backup, restore, check-in, and checkout of Local Environments for the PeopleSoft product family.

51.   "Bundle" is a collection of files corresponding to more than one Fix.

52.   "CD Binders" refers to Defendants' binders containing the CDs and/or DVDs copied from the original Oracle Enterprise Application Software Install Media provided by (and generally organized by) SAP TN's customers during the On-boarding process, as testified

to by Defendants' witnesses. The CD Binders also contain numerous photocopies of such CDs and DVDs.[4]

53.   "Client CD Jukebox" refers to the central repositories for Oracle original Install Media identified on two SAP TN servers, TNFS_01 and TEMPSTORE.

54.   "Contamination" – A Fix is "Contaminated" if Cross-Use of any software occurred at any point in the development, testing, or production of any Object for that Fix. Mandiant has defined several categories of Contamination. See Additional-Customer Contamination, Cross-Use Contamination, DAT Contamination, Hash Contamination, and Source Group Contamination.

55.   "Cross-Use" means a use of an Environment, Oracle Database Software, or SSMs licensed to one customer to provide support to another customer.

56.   "Cross-Use Contamination" means that a Fix intended for or delivered to one customer is generated through the Cross-Use of Oracle Enterprise Application Software, Oracle Database Software, or SSMs not originally obtained from, downloaded on behalf of, or licensed to that customer.

57.   "Customer Connection" refers to Oracle's password-protected website designed to provide access to Oracle SSMs, including through the tools known as Change Assistant.

58.   "DAT" File – A data change delivered to a PeopleSoft customer that modifies the data values stored within an Environment typically includes a file containing the new data with a ".dat" extension. These files are referred to as "DAT" files.

59.   "DAT Contamination" means that one or more DAT files (a ".dat" or data file) in a Fix intended for or delivered to one customer are generated from either a Generic Environment or from another customer's Environment.

60.   "Data Warehouse" is the set of SAP TN servers selected by Defendants and made available for Oracle's review through a forensic review tool called EnCase. Data Warehouse excludes materials from several servers or server partitions, including DCITBU01_G, WEB01, MAIL03, and SAP TN's AS/400. A complete list of servers comprising the Data Warehouse can be found in eAppendix – "ORCLX-MAN-000142".

61.   "DCITBU01_G" is the server partition where the vast majority of SAP TN's materials downloaded from Customer Connection, SupportWeb, and MetaLink were stored.

62.   "Delivered Updates and Fixes" is the set of production materials provided by Defendants purported to contain all materials delivered by SAP TN to its customers. A list of these materials can be found in Appendix B.

63.   "DMS" – A data change Fix delivered to a PeopleSoft customer typically includes a text file known as a "script" to apply the data in the DAT file to the customer's Environment. These files typically have a ".dms" extension and are referred to as "DMS" files or "Data Mover Script" files.

64.   "Environment" or "Local Environment" is the combination of an installation or copy on SAP TN systems of Oracle Enterprise Application Software (base application) and a corresponding database. In the case of PeopleSoft, Environment may refer to either or

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[4] I understand that Oracle and Defendants began jointly indexing the labels of the media contained in the CD Binders on or about October 30, 2009 and completed the project on November 24, 2009. *See* Table D.

both of a PS_HOME and PeopleSoft Database. In the case of JD Edwards, Environment may refer to a copy of File-based objects included in a "B7333" sub-directory. See Appendix O.

65.   "File-based Objects," when used with reference to PeopleSoft, means COBOL source code files, SQR files, and SQC files. With reference to JD Edwards, "File-based Objects" means ".c" and ".h" files.

- PeopleSoft - COBOL files use Common Business-Oriented Language, a widely-used language geared specifically towards business functions. SQR files use Structured Query Reporter language, and are typically used to access databases and generate reports and print from them. SQC files are Structured Query Language Common Code Files, and are also used to query and report from databases (and can be used in conjunction with SQR files).
- JD Edwards - .c and .h files are, respectively, source code and header files that perform business functions within JD Edwards software.

66.   "First Deliverable" refers to the initial occurrence when a SAP TN client received a reference to a specific Fix ID.

67.   "Fix" means any software application patch, fix, code change, or Update, including bug fixes, tax or regulatory updates, or Bundles. Fixes typically address known or reported issues with the functionality of the software that can be corrected by applying new or modified code or other data, in the form of Fix Objects, for example to address new regulatory requirements that affect payroll software. They can be delivered individually, or grouped with other Fixes and delivered as Updates or bundles. With respect to the PeopleSoft product family, Fixes typically included one or more of the following types of files: COBOL source code files, SQR files, SQC files, DAT files, DMS files (Data Mover Script files), Project Files, Online Objects, and documentation.

68.   "Fix ID" means a unique alphanumeric string assigned by SAP TN to each Fix. Through SAS, each Fix ID linked Fix Objects and documentation modified, developed, or repackaged by SAP TN to a Master Fix Record and often to other Fix-delivery documentation such as development and test plans.

69.   "Fix-mastering" means SAP TN's process for updating a Local Environment. To Fix-master, SAP TN would apply any necessary Fixes (either delivered by Oracle or SAP TN) to a Local Environment so that it would be as close to SAP TN's (and Oracle's) most recent code line as possible.

70.   "Fix Object" means an Object contained within or otherwise delivered by a Fix.

71.   A "Generic Environment" is an Environment not attributed by name to a customer.

72.   "Hash Contamination" occurs when two customers receive a Fix Object with exactly the same MD5 Hash.

73.   "Install Media" refers to a CD or DVD, an electronic image of a CD or DVD, a binary executable, or a compressed file that, when run or executed, creates one or more instances of Oracle Enterprise Application Software or Oracle Database Software.

74.   "JD Edwards" refers to the JD Edwards software releases and versions, both that brand of products within the Oracle family of products and the specific JD Edwards products and versions referenced in tables 35 and 36 in Section X.

75.   "Master Fix" means the initial or baseline created set of Fix Objects to comprise a Fix that SAP TN will then copy, package and deliver, in some form, to more than one customer.

76.   "Master Fix Record" is a record in SAS that described the modification, development, testing, and repackaging of Fixes.

77.   An "MD5 Hash" is a unique identifier generated by a computer using a mathematical algorithm. This hash value is used as a "digital fingerprint" for its corresponding file. Computer forensic examiners often use MD5 Hash values to identify files that are identical to one another. If two files have the same MD5 Hash, then the files are considered identical.

78.   "MetaLink" is a password-protected Oracle website from which SSMs related to Oracle Database Software and Oracle Enterprise Application Software were made available to Oracle customers.

79.   "Object," with respect to PeopleSoft, means a File-based Object, a DAT file, a DMS file, a Project File, PeopleCode, or an Online Object. With respect to the JD Edwards, "Object" means a source file (".c") or header file (".h") in the C programming language.

80.   "On-boarding" means SAP TN's process for preparing to support a new customer. According to SAP TN testimony and documents, steps in this process included some or all of the following: obtaining the customer's credentials for Customer Connection or SupportWeb, obtaining Install Media for Oracle Enterprise Application Software either from the customer or from Oracle using the customer's information, copying that Install Media onto physical media maintained in the CD Binders, copying that Install Media into a "Client CD Jukebox" directory on SAP TN's servers, creating one or more Local Environments on SAP TN's systems and labeling the Environments with that customer's name, Fix-mastering the Local Environments, and testing and making backup copies of the Local Environments.[5]

81.   "Online Object" means a component of a PeopleSoft product that is stored in the database or in a Project File. Types of Online Objects include PeopleCode Objects, fields, records, pages, menus, components, messages, panels, stored statements, panel groups, application packages, and application engines.

82.   "Oracle Database Software" refers to the specific versions and editions of Oracle's Relational Database Management System software that existed on SAP TN's systems. Oracle Enterprise Application Software with database components, such as a PeopleSoft Database, may use Oracle Database Software or non-Oracle database software (such as DB2 or SQL Server) as its underlying database. Specific versions of Oracle Database Software existing on SAP TN's servers include: 8.x, 9.x, and 10g.

83.   "Oracle Enterprise Application Software" refers to PeopleSoft, JD Edwards, and Siebel (see the definition for each for additional detail).

84.   "Pathfinder" is one of SAP TN's tracking systems for the status of Local Environments for all Oracle Enterprise Application Software.

85.   "PeopleCode" is an Object-oriented proprietary language used to express logic for PeopleSoft applications.

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[5] Mandiant has identified certain exceptions to some steps in this process. For instance, some Environments were not labeled for any specific customer.

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86. "PeopleSoft" or "PeopleSoft Enterprise Application Software" refers to PeopleSoft software releases and versions, both that brand of products within the Oracle family of products and the specific PeopleSoft products and versions referenced in tables 35 and 36 in Section X.

87. "PeopleSoft Database" means a database containing all or part of a PeopleSoft Schema.

88. "PeopleSoft Schema" means Oracle's data model for PeopleSoft, as expressed in the database schema for the PeopleSoft Enterprise Application Software and PeopleTools tables. The PeopleSoft Schema stores and processes the information associated with and necessary to the operation of PeopleSoft applications and PeopleTools.

89. "PeopleTools" refers to the development utility created by PeopleSoft to build or customize PeopleSoft applications.

90. "Project File" means one or more Online Objects. A Project File can be either a PRJ file or a pair of DAT and DMS files.

91. "PS_HOME" means a directory containing files for a PeopleSoft Environment, including but not limited to File-based Objects and configuration files.

92. "Registered Works" means some or all of the works identified in paragraph 158 of the Fourth Amended Complaint. In reference to Oracle Enterprise Application Software, Oracle Database Software, and SSMs, "Registered Works" refers to the materials described in tables 35 and 36 in Section X.

93. "Remote Environment" is an Oracle Enterprise Application Software environment installed on a machine other than SAP TN's servers for which there is a remote connection and access by SAP TN, such as through VPN.

94. "SAS" is SAP TN's internal customer relationship management database. SAS was maintained by SAP TN employees, and was commonly used to track SAP TN customers, Fixes, development documents, testing documents, source group documents, and other information and files.

95. "Siebel" or "Siebel Enterprise Applications Software" refers to the Siebel software releases and versions, both that brand of products within the Oracle family of products and the specific Siebel products and versions referenced in tables 35 and 36 in Section X.

96. "Source Group Contamination" means that a Fix was developed for a source group of more than one SAP TN customer.

97. "SSM" means a software or related support material copyrighted by Oracle, including program updates, software updates, bug fixes, patches, custom solutions, instructional documents, knowledge management solutions, FAQs, Tech Notes, Alerts and similar customer support materials related to Oracle software products, including the PeopleSoft, JD Edwards, Siebel, and Oracle Database families of software products.

98. To "Support Oracle Products" means to provide maintenance and/or support services for PeopleSoft, JD Edwards, and/or Siebel Enterprise Application Software.

99. "SupportWeb" was a password-protected Oracle website from which Siebel materials could be downloaded.

100. "Update" means a group of Fixes delivered together in a single deliverable, either by Oracle or SAP TN. The most typical Updates relevant to Mandiant's analysis were tax and regulatory Updates for PeopleSoft's HRMS product line.

101. A "Virtual Machine" is software that allows a user to run multiple operating systems on one piece of hardware. A virtual machine is nearly indistinguishable from a stand-alone, traditional computer.

V. OVERVIEW OF SAP TN

A. BACKGROUND OF THE RELEVANT SOFTWARE

102. Computers use enterprise software to operate and organize data – specifically, to perform functions that companies need to run their everyday business activities. Oracle owns, licenses, and provides support for various brands of Enterprise Application Software, including PeopleSoft, JD Edwards, and Siebel. In addition to Enterprise Application Software, Oracle also owns, licenses, and provides support for numerous database products, including Oracle Database Software. Oracle Database Software stores and organizes data of the type that Enterprise Application Software can interact with in performing its functions.

103. All of these brands, PeopleSoft, JD Edwards, Siebel, and Oracle Database, have been either home-grown by Oracle or have been incorporated into the Oracle family of products through acquisition. Oracle acquired PeopleSoft and its products in January 2005 and Siebel and its products in September 2005.

104. Oracle has designed Oracle Database Software to work with Oracle's Enterprise Application Software. In other words, a product such as PeopleSoft HRMS is pre-loaded with the structure of the Oracle Database software so that customers can both store and use their data more efficiently in one integrated technology stack, making the customer's information management less complicated and less expensive to manage.

105. Oracle has spent considerable time, effort, and resources to continually improve Oracle's various products, including the Oracle Enterprise Application Software and Oracle Database Software. Oracle makes these improvements available to customers in the form of new versions and releases (also referred to as major versions and minor versions, respectively). Though there have been variations over time and across Oracle's products, a new version has generally meant a more significant change in overall functionality, while a release is less significant by comparison. Versions and releases are typically represented numerically and separated by a "dot". For instance, "PeopleSoft HRMS 8.3" refers to version 8, release 3, of the PeopleSoft HRMS product. Oracle owns each of these releases and versions, and has invested heavily in them over time, including through its $11.1 billion acquisition of PeopleSoft and approximately $6 billion acquisition of Siebel.

106. In addition to licensing Oracle Enterprise Application Software from Oracle, customers may also elect to receive support on the software from Oracle, which means customers are eligible to receive Updates, Fixes, and other assistance with the Oracle Enterprise Application Software.

107. SAP TN also Supported Oracle Products for certain aspects of Oracle Enterprise Application Software. Within each of these product families, SAP TN supported specific Oracle Products in various ways. For PeopleSoft, SAP TN supported the Human Resources Management Systems (HRMS), Financials (Fin), Customer Relations Management (CRM), and Enterprise Performance Management (EPM) products.[6] Oracle and its predecessors released these software products in different releases over time, and in different versions within each release. SAP TN supported specific releases and versions of each of these products. For example, the earliest version of PeopleSoft's HRMS product supported by SAP TN that Mandiant analyzed was version 7.02 (which indicates release seven, version two). In addition, these software products consist of various modules that customers separately licensed. Within PeopleSoft HRMS, for

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[6] *See generally* SAS database engagement records.

example, most customers will license the payroll module. JD Edwards software is comprised of two related but distinct code lines – EnterpriseOne and World. SAP TN supported both, including various products within each code line. Similarly, SAP TN supported both the CRM and Analytics lines of Oracle's Siebel software product family.

108.   In addition to Mandiant's analysis of SAP TN's Data Warehouse and other evidence produced in this case, Mandiant also conducted interviews of several Oracle employees as part of its investigation and analysis. These employees, who have significant experience working with the relevant software for a number of years, fostered Mandiant's understanding related to several aspects of Mandiant's conclusions, including the history, architecture, and components of Oracle Enterprise Application Software and Oracle Database Software, and the nature and quality of Oracle's expression in each. Additionally, Mandiant interviewed many Oracle employees as well as two of Oracle's other experts in this case – Dr. Daniel Levy and Professor Douglas Lichtman – with respect to statistical analysis of the data, and the nature of protected expression and derivative works. Mandiant provides citations to these interviews in some places within this report for reference, but those citations are non-exclusive, as the information provided by the employees and experts has broadly informed my understanding of the evidence. Below is additional detail about these individuals:

- Norm Ackermann – Senior Oracle developer for PeopleSoft Enterprise Application Software, including PeopleSoft HRMS.
- Carlos Barradas – Senior Principal Critical Accounts, Oracle employee with in-depth knowledge regarding the licensing of specific Oracle products.
- Uwe Koehler - Senior Director Global Information Security, Compliance/Risk; Oracle employee with knowledge of Oracle's network and security systems.
- Dr. Daniel Levy - National Managing Director and a founder of Advanced Analytical Consulting Group, Inc. ("AACG").
- Professor Douglas Lichtman - UCLA Law Professor.
- Edward Screven – Oracle's Chief Corporate Architect responsible for architecture decisions across all Oracle product lines.
- Greg Story - Oracle Senior Database Administrator familiar with installations of JD Edwards World on AS/400 servers
- Dan Vardell - Senior Director Engineering Programs, Oracle CRM; Oracle employee with in-depth knowledge regarding Siebel software products, including release management

1.   Introduction to PeopleSoft[7]

109.   Of the Local Environments SAP TN made, and of the Fixes it provided to customers, the majority involved the creation and delivery of tax and regulatory Updates for the PeopleSoft Enterprise Application Software HRMS payroll product. Therefore, I used the PeopleSoft HRMS payroll product as an example of how PeopleSoft products required and employed Fixes and Updates. These Updates consisted of Fixes that were comprised of Objects. PeopleSoft Fixes generally consisted of three types of Objects – File-based Object changes, Online Object changes, and data changes. A Fix may contain File-based Object changes only, Online Object changes only, data changes only, or some combination of the three:

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[7] I am aware of the information in this section from discussions with Oracle employees Edward Screven and Norm Ackermann, as well as my analysis of the software on SAP TN's systems over the past more than two years of discovery.

- File-based Object changes typically involve modifications to the code files located in a PS_HOME that perform various functions within the PeopleSoft software. Common code objects were SQR files, SQC files, and COBOL files.

- Online Object changes typically involve modifications to Oracle Enterprise Application Software code that resides in a database including business logic called PeopleCode and user interface elements such as menus, pages or panels, records, or fields. All changes to Online Objects had to be performed using PeopleTools.

- Data changes typically involve changes to the data values stored within a PeopleSoft Environment that are used as the inputs for the software's functions, for example, tax rates, withholding rates, exemption amounts, etc. Data changes typically involved the generation of a new data (DAT) file containing the data, and the creation of a new data mover script (DMS) to apply the data in the DAT file to the Environment.

110. Customers running PeopleSoft HRMS payroll need Fixes, versions of which are also provided by Oracle, to support their internal payroll functions. PeopleSoft HRMS payroll calculates earnings for a customer's employees and incorporates federal, state, and local (and Canadian) regulations to account for taxes, deductions, exemptions, etc. The product also has many other features, such as check printing, direct deposit, the ability to set garnishment rules, year-end processing, and time-off tracking, any of which may be affected by regulation as well. Support for this product thus requires tracking and addressing many types of possible changes to federal, state, and local law, such as laws relating to taxes, withholding rates, minimum wage, deferred compensation laws, and reporting requirements (to name a few). Different types of changes to the law require different types of modifications to different parts of the software, and these modifications must be developed, tested, and documented. Further, since most customers have employees in multiple jurisdictions, the changes addressing different jurisdictions have to be bundled together and tested again before delivery. The final deliverable to the customer can be complex, and may include modifications to and/or newly-developed PeopleSoft Objects, including SQR files, SQC files, COBOL files, data files, data mover scripts, Project Files, and/or several others. For all of these reasons, both Oracle and SAP TN delivered regularly-scheduled PeopleSoft HRMS payroll tax and regulatory Fixes, within Updates or bundles, so their customers could stay current with the changing regulatory landscape.

111. The combined installation of the PeopleSoft base application and PeopleTools utility create a directory, commonly referred to as a PS_HOME. Source and application code from the Install Media is stored on the target file system within the PS_HOME directory. In addition to PeopleTools and the PeopleSoft Base Application, the PeopleSoft software needs a database product to function as an Environment. The PeopleSoft applications contained within a PS_HOME directory are used to connect to a database and populate it with structures and PeopleCode. The database can be vendor-agnostic, such as Oracle, SQL Server, Sybase, DB2, but once it is associated with a PS_HOME directory, the database contains Oracle code. In other words, installed PS_HOMEs and PeopleSoft databases both contain Oracle code.

112. In conversations with Oracle employees including Oracle's Chief Corporate Architect, Edward Screven, and Norm Ackermann, I have been informed that COBOL, SQR, and SQC files are the result of creative expression and embody a developer's particular choices. It is my understanding that there would be more than one way to solve any particular problem in these types of files. It is also my understanding that these files contain comments and other nonfunctional material, and that the names of these files and the variables and functions within these files are largely arbitrary, and the result of a developer's creative expression.

113.   Also based on my conversations with these employees, it is my understanding that changes to the PeopleSoft data model and PeopleSoft Schema and changes made to both PeopleCode and online objects through Application Designer are the result of creative expression and embody a developer's particular choices. It is my understanding that there would be more than one way to solve any particular problem in these types of files or data structures. It is also my understanding that the names of tables and fields added to the PeopleSoft data model and PeopleSoft Schema, and the names of online objects and PeopleSoft functions and variables, are largely arbitrary, and the result of a developer's creative expression.

114.   Furthermore, based on my own experience with shell scripts and other interpreted languages, and based on my own experience with COBOL and other compiled languages, I understand that development in these languages involves a developer's particular choices and embodies creative expression.

115.   From conversations with Doug Lichtman, I understand that computer code in various forms qualifies for protection under copyright law as long as it demonstrates a modicum of creativity. That is, according to Professor Lichtman and consistent with my own experience, at the time someone writes the code that instructs the computer in how to accomplish its tasks, populates the data files that store information relevant to those tasks, and designs the overall structure and many substructures of this complicated system, each of those activities presents to those relevant authors a wide range of choices in terms of what words to use, what organizational schemes to adopt, and how to achieve the relevant functional and/or expressive goals. Different people will make different choices in these activities.

116.   Based on the above, COBOL, SQR, and SQC files, online objects, and changes and additions to the PeopleSoft data model and PeopleSoft Schema would qualify for protection under copyright law as a creative work.

2.   Introduction to JD Edwards[8]

117.   The JD Edwards products SAP TN supported, including World and OneWorld, do not require the regular and complex tax and regulatory Fixes needed for PeopleSoft HRMS Payroll products. Some Fixes are still required, but for this reason SAP TN did not have nearly as many Local Environments or deliver as many Fixes for JD Edwards customers as it did for PeopleSoft customers.

118.   A JD Edwards Environment of the type SAP TN used to support its customers is created by installing a JD Edwards application, and populating a database with code originating from the JD Edwards application. This installation creates a directory that contains, among other types of JD Edwards objects, File-based Objects referred to as ".c" and/or ".h" files. JD Edwards Fixes may contain new or modified Fix Objects, including ".c" and/or ".h" files.

119.   As with PeopleSoft, the JD Edwards software needs a database product to function as an Environment. An installed JD Edwards Environment contains Oracle code.

120.   In conversations with Oracle employees including Oracle's Chief Architect, Edward Screven, and Oracle employees Jason Rice and Buffy Ransom, I have been informed that ".c" and ".h" files are the result of creative expression and embody a developer's

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[8] I am aware of the information in this section from discussions with Oracle employees Edward Screven, Buffy Ransom, and Greg Story, as well as my analysis of the software on SAP TN's systems over the past more than two years of discovery.

particular choices. It is my understanding that there would be more than one way to solve any particular problem in these types of files. It is also my understanding that these files contain comments and other nonfunctional material, and that the names of these files and the variables and functions within these files are largely arbitrary, and the result of a developer's creative expression.

121.   In conversations with Oracle's Chief Architect, Edward Screven, and Oracle employee Greg Story, I have been informed that the source code members comprising JD Edwards World are the result of creative expression and embody a developer's particular choices.

122.   Furthermore, based on my own experience with C and other compiled languages, I understand that development in these languages involves a developer's particular choices and embodies creative expression.

123.   From conversations with Doug Lichtman, it is my understanding that software development that involves a developer's particular choices and embodies creative expression qualifies for protection under copyright law. It is my understanding that the ".c" and ".h" files comprising JD Edwards EnterpriseOne and the source code members comprising JD Edwards world would qualify for protection under copyright law.

B.   SAP TN'S COPYING AND USE OF PEOPLESOFT SOFTWARE

124.   SAP TN supported its PeopleSoft HRMS customers using two similar and related tax and regulatory Update models over time:

- Retrofit (or Extended) Support Model ("RSM")
- Critical Support Model ("CSM")

125.   The following sections summarize the results of my investigation into and analyses of the general support process for the two models based upon review of all data examined, including the Data Warehouse, testimony from Defendants' witnesses, discovery responses, and other documents produced by Defendants. In general, although the names are different, the two models do not differ in their reliance on many Cross-used copies of Environments to support multiple customers. [9]

1.   Retrofit Support Model

126.   In the RSM, SAP TN would use a published Oracle Update, along with Generic Environments, to generate an Update for earlier software releases.[10] The RSM required SAP TN to make many copies of Oracle Enterprise Application Software in the form of Local Generic Environments, and backups of those Environments, to produce a Fix that it

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[9] *See, e.g.*, Defendants' Responses to Plaintiffs' Fifth Set of Requests for Admission, No. 93 (admitting "that the occurrence of applying changes created in one local environment to a different client was not limited to the category of retrofit tax updates."). Mandiant reserves the right to amend or supplement its conclusions, report, or both, if Defendants later provide any information contradicting that statement.

[10] *See, e.g.,* Deposition of Catherine Hyde, April 2, 2008 at 114:13-127:25; 175:2-189:2; Plaintiffs' Deposition Exhibit 89. Throughout this report, when referring to deposition testimony, Mandiant is also referring to any exhibits which are the subject of such testimony. Also, in many cases illustrative testimony or documents are cited (such as by saying, "See, e.g."). Such references are not intended to be exclusive sources of information. Numerous SAP TN witnesses have testified about SAP TN's support services, and Mandiant's understanding of both general and specific aspects of those services is informed by all of the testimony and documents it has reviewed, as reflected in ORCLX-MAN-000208.

would deliver copies of to multiple customers.[11] The following steps summarize Mandiant's understanding of the RSM based on its review of relevant evidence[12]:

a) Step 1: Create Generic Environments

127.   SAP TN made initial copies of Oracle Enterprise Application Software by using Install Media provided by SAP TN customers and then used certain of these initial copies to create Generic Environments for certain PeopleSoft releases. Testimony indicates that the bulk of the Generic Environments used in the RSM started as copies of Oracle Enterprise Application Software provided by SAP TN customers Safeway, Washington Gas Light, and/or North Carolina State University.[13] SAP TN obtained copies of Oracle Enterprise Application Software from these customers on CDs, and then used these CDs to install the Environments, which SAP TN later copied repeatedly.[14]

b) Step 2: Make Multiple Copies of Generic Environments to Generate the Fix

128.   SAP TN made and used Generic Environments to replicate, develop, test, and deliver Fixes to support all or several customers on each Oracle Enterprise Application Software release supported by SAP TN.[15] Figure 3 is a graphical representation of the RSM process, illustrating the different Environments used and how the downloaded Oracle Update is applied. For example, according to the process testified to by SAP TN's witnesses, to create its version of Oracle's 05A Update for 7.51C customers, SAP TN first made a copy of the prior Generic 7.51 Environment – HR75104F – and renamed it HR75105A. This process is also reflected in the BakTrak tables in tables 1 and 2. The tables also show that SAP TN then made a "REP" Environment of HR75105A for replication, a "DEV" Environment for development, a "TST" Environment for testing, and multiple other copies for various purposes, including to begin work on the next Update (05B).[16]

129.   The following table 1 from BakTrak shows a minimum of 7 Generic Environments copied from 5 different backup copies of Generic Environments related to the development of the "05A" Fix.

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[11] *See, e.g.,* Defendants' Responses to Plaintiffs' Second Set of Requests for Admission, Nos. 496-668. This group of approximately 173 Requests for Admission, which total approximately 500 written pages, were supplemented by Defendants on October 19, 2009. Because of the size and timing of these responses, Mandiant has not reviewed them in detail, but understands they are relevant to certain of Mandiant's conclusions, and Mandiant reserves the right to modify or supplement this disclosure, and/or simply consider and rely upon this information after production of this report, including any further supplementations to these responses, which I understand the parties are still negotiating.

[12] Mandiant also relies generally upon the documentation found in the Data Warehouse, including the Retrofit Project Plans in "Consultant Docs and Templates," to inform its understanding of the Retrofit Support Model as described in this section. *See, e.g.,* "2005B-8SP1 to 7 x Retrofit Project Plan 20050412.xls" found in "Consultant Docs and Templates\Work Documents\Tax Update Work Documents\TN-2005B" on TN-FS01_F. *See also* Plaintiffs' Deposition Exhibit 29; Deposition of Shelley Nelson, December 6, 2007 at 235:12-238:9.

[13] *See, e.g.,* Deposition of Catherine Hyde, May 12, 2009 at 6:15-47:25; Deposition of John Baugh, February 6, 2008 at 14:7-20:6; 24:7-31:5; 63:17-67:6; Plaintiffs' Deposition Exhibits 1253-1260. Defendants provided additional information about the source software for many Environments on November 16. See Table C.

[14] *Id*.

[15] *Id*.

[16] *See, e.g.,* Deposition of Catherine Hyde, April 2, 2008 at 114:13-127:25; Deposition of Catherine Hyde, May 12, 2009 at 6:15-47:25.

RESTORE_ID	APPLICATION	TARGET_ENV	SOURCE_ENV	BACKUP_FILENAME	RESTORE_DATE TIME	DESCRIPTION	PERFORMED_BY
213	HRMS	HR75105A	HR75104F	HR75104F_20041217	12/21/2004 9:58	create 05a env (need to apply 04f)	chyde
217	HRMS	HR75105A	HR75104F	HR75104F_20041208	12/21/2004 16:09	create 05a env (need to apply 04f)	chyde
220	HRMS	HR751TST	HR75105A	HR75105A_20041221_1633	12/21/2004 16:38	refresh with 04F -BUT N 04F test data	chyde
235	HRMS	HR751DEV	HR75105A	HR75105A_20050114_1350	1/14/2005 14:00	refresh for 05A dev	glester
236	HRMS	HR751REP	HR75105A	HR75105A_20050114_1350	1/14/2005 14:00	refresh for 05A rep	glester
239	HRMS	HR75105A	HR75105A	HR75105A_20050114_1350	1/17/2005 8:34	PRE-POST COMPARISON PAYROLL	glester
249	HRMS	HR75105B	HR75105A	HR75105A_20050125_1230	1/25/2005 16:45	Restore from 05A	jbaugh

Table 1: HRMS 7.51 Environment Creation for 05-A in BakTrak

130. The table below from BakTrak shows 5 backup copies of Generic Environments being created and stored during the development of the "05A" Fix. Note that certain of the backup copies are the same files that are then copied again to create new environments (e.g., HR75105A_20050114_1350).

BCK_ID	ENVIRONMENT	FILENAME	DATE_TIME	DESCRIPTION	PERFORMEDBY	FORMAT
58	HR81005A	HR81005A_20050114_1356	1/14/2005 13:56	HR81005A with 05A applied	nvuong	.zip
386	HR75105A	HR75105A_20041221_1633	12/21/2004 16:35	04F applied - starting 05a	chyde	.zip
402	HR75105A	HR75105A_20050114_1350	1/14/2005 13:50	05A DATA READINESS COMPLETE	glester	.zip
405	HR75105A	HR75105A_20050120_0842	1/20/2005 8:42	Post 05A	nvuong	.zip
409	HR75105A	HR75105A_20050125_1230	1/25/2005 12:30	Post 05A	jbaugh	.zip

Table 2: HRMS 7.51 Environment Creation for 05-A in BakTrak

c) Step 3: Download and Apply Oracle's Update

131. SAP TN usually downloaded the latest Update developed by Oracle from the Customer Connection website to use as the source for its own Update. According to testimony, SAP TN typically did this using one customer's credentials, commonly that of Bear Stearns.[17] SAP TN usually then applied a copy of this Update to an existing Generic Environment to study it and learn how to generate a similar Update for earlier releases, *i.e.*, by modifying some or all of the Objects using multiple Generic Environments for different releases.[18] For instance, continuing with the "05A" Update example above – SAP TN downloaded Oracle's 05A Update for the HRMS 8 SP1 release and copied it to a Generic HRMS 8 SP1 Local Environment. SAS and BakTrak both reflect this activity.

132. The Issue Summary field in the SAS Master Fix Record for 2005A-751C states that this Fix is "to be retrofitted from PeopleSoft Tax Update 2005A for PeopleSoft 8SP1 HRMS."

133. The figure below shows a portion of a Master Fix Record showing the three Oracle "Sources" SAP TN would use for its 2005A-751C Update.[19]

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[17] *See, e.g.,* Deposition of Catherine Hyde, April 1, 2008 at 44:45-61:14; Deposition of Shelley Nelson, December 6, 2007 at 125:25-132:9.

[18] *See, e.g.,* Deposition of Catherine Hyde, April 2, 2008 at 114:13-127:25.

[19] *See also, e.g.,* Deposition of Catherine Hyde, April 2, 2008 at 219:22-230:8.

Figure 1: Screen Shot from the Master Fix Record of 2005A-751C in SAS

134.   The table below from BakTrak shows SAP TN restoring a copy of the HRMS 8 SP1 Generic Environment, HR81004F, "to create HR81005A."

RESTORE_ID	TARGET_ENV	SOURCE_ENV	BACKUP_FILENAME	RESTORE_DATE TIME	DESCRIPTION	PERFORMED_BY
30	HR81005A	HR81004F	HR81004F_20041210_0757	1/5/2005 2:14	To create HR81005A	glester

Table 3: BakTrak Record for HR81004F

135.   Sometimes, SAP TN would also copy Oracle's Update directly into SAS and store it there for reference, as reflected by the figure below, showing a portion of the Master Fix Record for SAP TN's 2003G-751C Update.
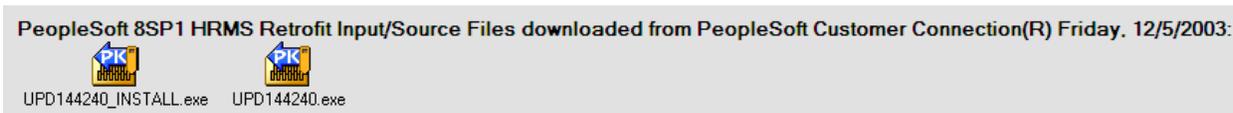
Figure 2: Screen shot from the Master Fix Record of 2003G-751C in SAS

d) Step 4: Use Generic Environments to Develop Objects for the Retrofit Fix

136.   After applying Oracle's Update, SAP TN typically compared the updated Generic Environment to another pre-Update Generic Environment to determine how the Objects delivered by Oracle changed the way an Environment on that release operated. This allowed SAP TN to modify or create Objects for earlier releases in a way that also produced the desired changes.[20] Continuing with the 05A example above, SAP TN would have first compared the Objects in its newly-updated HR81005A Environment with the prior HR81004F environment. SAP TN could do this manually, simply by looking at the Objects, but often used a comparison tool called Araxis Merge that could identify each individual line-by-line change.[21]

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[20] *See, e.g.,* Deposition of Catherine Hyde, April 2, 2008 at 175:2-189:2; Deposition of Catherine Hyde, April 1, 2008 at 44:25-61:14.

[21] *Id.*
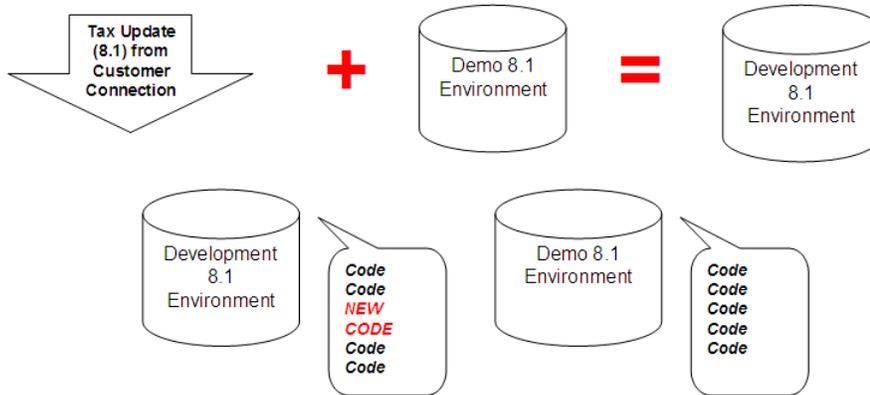
Figure 3: Graphic Representation of Using Oracle's Update to Develop a Retrofit

137. SAP TN then used its HR751 Generic Environments to implement the same changes Oracle had. Each copy of a Generic Environment had a different purpose. SAP TN would attempt to replicate the issues Oracle identified in SAP TN's REP Environment, to be sure the issue was relevant to older releases. SAP TN would use the DEV Environment to modify the impacted Fix Objects that comprised the Fix (doing this for all Fix Objects in all Fixes that comprised an Update). In some cases, SAP TN could "cut-and-paste" from the Oracle Update, and other times it manually modified certain Objects to achieve equivalent functionality. SAP TN could then test its Fix in the TST Environment. SAP TN would compare Objects using Araxis Merge throughout this process, including determining if the same changes could be made for other earlier releases, such as HRMS 7.02.[22]
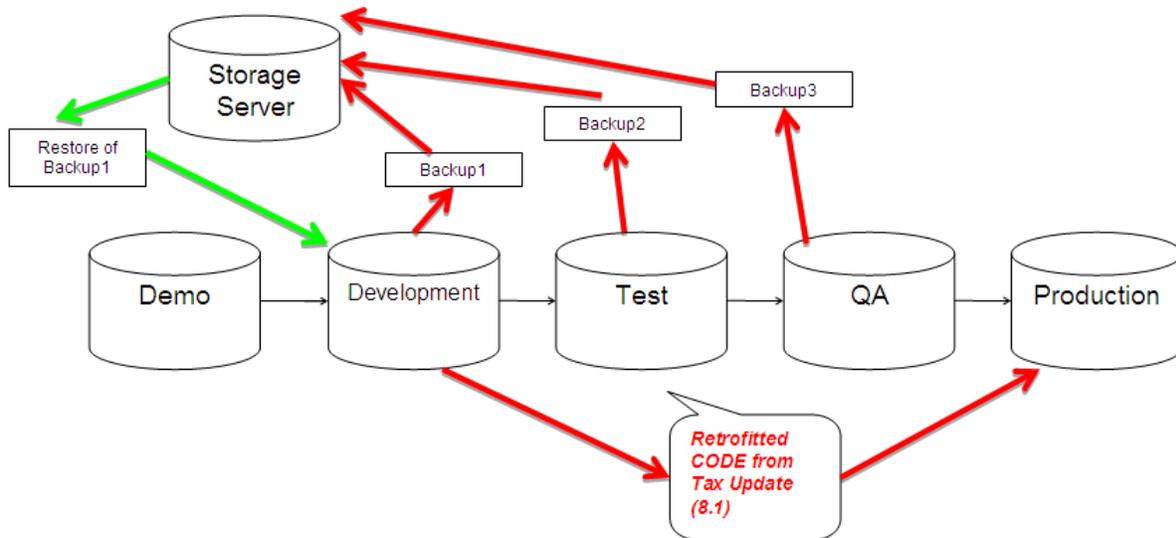
Figure 4: Graphic Representation of Environment Copies in Retrofit Process

138. The example description above for 05A was with respect to work done for customers on one release supported by SAP TN – 7.51 Commercial. SAP TN delivered Updates

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[22] *Id.* Also, Oracle employee Norm Ackerman has demonstrated to me that a similar comparison for online objects in a PeopleSoft Database can be performed using the Application Designer functionality of PeopleTools.

retrofitted from Oracle's published Updates to at least five other groups of customers – 7.51 Education & Government, 7.51 Student Admin, 7.02 Commercial, 7.02 Public Sector, and 7.02 Student Admin.[23] For each of these releases, SAP TN used multiple Generic Environments to modify the requisite Objects similar to the process described above.   Ultimately, the copy of Oracle's Update downloaded by SAP TN using one customer's credential was copied and modified to some extent to deliver retrofit Updates to the customers supported by SAP TN on each of these releases at the time of the Update.
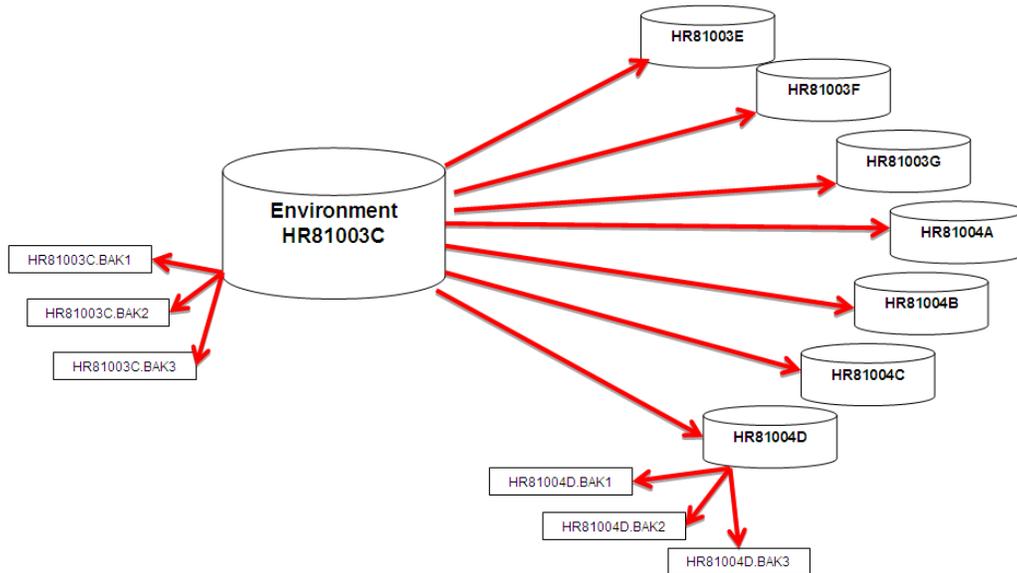
Figure 5: Graphic Representation of Environment Copies in the Retrofit Process Over Time

139.   To summarize, SAP TN's RSM depended on both previously-published Oracle Updates and many copies of Generic Environments.   After creating Generic Environments, SAP TN would make multiple copies of them, download and apply Oracle's Update to them, and use them to develop the Objects for the RSM Fix.

2.   Critical Support Model

140.   The CSM involved a similar process as the RSM, but did not typically involve using an Oracle Update as SAP TN's source. Most of SAP TN's PeopleSoft customers were CSM customers. The CSM model required SAP TN to make many copies of Oracle Enterprise Application Software in the form of Local Environments to produce a Fix. The following description summarizes Mandiant's understanding of the CSM.

a) Step 1: Create Environments to Use for Similar Customers

141.   Under the CSM, SAP TN began assigning customer names to its Local Environments, but continued to use these Environments to support groups of customers rather than only the customer for whom SAP TN had labeled the Environment.[24] SAP TN sometimes built

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[23] *See, e.g.,* Deposition of Shelley Nelson, December 6, 2007 at 132:14-134:24.

[24] *See generally* Deposition of Catherine Hyde, April 2, 2008 at 72:13-90:7; Deposition of Catherine Hyde, May 12, 2009 at 91:3-105:15; Deposition of Rod Russell, June 25, 2008 at 15:13-52:8; SAP TN's Responses to Plaintiffs' Fourth Set of Interrogatories, No. 82.

a customer's assigned Environment from Oracle Enterprise Application Software provided by that customer, and sometimes built it from another source.[25]

142.   As an example, SAP TN had a Local Environment called H801BAXO. The "BAX" label meant that SAP TN had labeled this Environment for Baxter International.[26] As reflected in the figure below, SAP TN would typically use Oracle original Install Media to create a Local Environment for new customers and then make a backup copy to have available if later needed.

BCK_ID	ENVIRONMENT	FILENAME	DATE_TIME	DESCRIPTION	PERFORMEDBY	FORMAT
1679	H801BAXO	H801BAXO_20061004_1751	10/4/2006 17:51	Initial backup after build	pgoldswo	.gz

Table 4: BakTrak record for Initial Build HR801BAXO in BakTrak

b) Step 2: Apply Downloads, Test, and Backup the Environments

143.   After the initial build of a Local Environment, SAP TN would typically apply Updates and Fixes to the Environment to bring it up to the most current available code release.[27] SAP TN would apply copies of Fixes downloaded from Oracle as well as previous Fixes generated by SAP TN using already-existing Environments built from Oracle Enterprise Application Software provided by other customers.[28] To ensure the Environment functioned properly, SAP TN would run a series of tests, sometimes using other Environments, and sometimes with tools developed using other Environments.[29] This activity is reflected in the BakTrak table below with respect to the H801BAXO Environment, showing a backup copy being made after the application of the older "06-D" Update, and again after passing the user acceptance test."

BCK_ID	ENVIRONMENT	FILENAME	DATE_TIME	DESCRIPTION	PERFORMEDBY	FORMAT
1694	H801BAXO	H801BAXO_20061010_1529	10/10/2006 15:29	After AU applied	nvuong	.zip
1701	H801BAXO	H801BAXO_20061012_1052	10/12/2006 10:52	After 06-D applied	nvuong	.zip
1764	H801BAXO	H801BAXO_20061025_0931	10/25/2006 9:31	User acceptance complete	mhosalli	.zip

Table 5: H801BAX0 Activity After Applied Updates in BakTrak

c) Step 3: Determine the Regulatory Issues to Address and Assign Tasks

144.   SAP TN monitored subscription regulatory services and public websites, as well as information published by Oracle on Customer Connection and in Oracle's own Fix documentation, to determine which federal, state, and local regulatory changes required

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[25] SAP TN did not always assign customer names to its Local Environments. For example, HR751CSS was a CSM Environment assigned to approximately four different customers (and used to support numerous others). *See, e.g.*, Deposition of John Baugh, Feb 6, 2008 at 43:17-50:24 (referring to HR751CSS as a "generic name"); Deposition of Catherine Hyde, April 1, 2008 at 34:9-35:8. Additionally, based on a review of both SAP TN's testimony and the information in the Data Warehouse, Mandiant does not believe there is a technical way to determine with absolute certainty which customer's Install Media was used to build any given Environment. *See, e.g.,* Deposition of John Baugh, February 6, 2008 at 66:15-76:14 ("The only way to really know that would be to look through all my e-mails and see if there's anything in any of my e-mails that would indicate that.").

[26] *See, e.g.,* Deposition of Kim Martinez, October 21, 2009 at 80:18-82:6.

[27] *See, e.g.,* Deposition of John Baugh, February 6, 2008 at 23:7-27:2; Deposition of George Lester, April 23, 2009 at 23:24-24:17; 28:18-29:10; Deposition of Jeff Buehrle, November 20, 2009 at 70:18-73:15.

[28] *See, e.g.,* Deposition of Catherine Hyde, May 12, 2009 at 57:2-91:2. ("[O]bjects that had already been modified or developed previously would be sent to a new customer as part of a synch up bundle and in some cases those previously developed objects would be referenced to create the objects to send to the new customer.")

[29] *See, e.g.,* Deposition of Melissa Garcia, July 30, 2008 at 61:7-66:13; 110:6-114:25; Deposition of Catherine Hyde, April 2, 2008 at 189:3-194:8.

modifications to the PeopleSoft Enterprise Application Software. Sometimes customers would report the issues to SAP TN. As SAP TN determined that an issue needed to be addressed, it would create a corresponding record in SAS and assign a Fix ID.[30] These sources are sometimes recorded in SAS's Master Fix Records, for example as shown in the figure below. In general, SAP TN used a Master Fix Record in SAS for each Fix, to collect and track the data related to the Fix that SAP TN would deliver to more than one customer.

Figure 6: Sample Critical Support Source Information from SAS

145.   SAP TN would then assign to its personnel the various tasks associated with generating the Fix, including scoping, development, and testing. Scoping was the process of determining a plan for resolving the issue, including which Objects would need to be modified or created, and SAP TN may have referenced Local Environments for that purpose for certain Fixes.[31] The figure below shows a sample portion of the CSS-TN-0103076718 Master Fix Record reflecting these assignments.

Figure 7: Sample Critical Support task assignments from SAS (CSS-TN-0103076718)

d) Step 4: Divide Recipient Customers into Source Development Groups

146.   The next step of the RSM was determining which customers would receive the Fix. Once SAP TN determined which customers would receive the Fix, it further divided that population into groups of customers to whom SAP TN could deliver copies of identical Fix Objects.[32] SAP TN referred to these divisions of customers as source groups, and

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[30] *See, e.g.,* Deposition of Rod Russell, June 25, 2008 at 15:13-52:8.

[31] *See, e.g.,* SAP TN's Responses to Oracle USA, Inc.'s Second Set of Interrogatories, No. 14, at pp. 46-56 (CSS-TN-0103076718) ("It is possible that Rapavy may have also attempted to use Waste Management's environment or environment components on TomorrowNow's network (H881WMIO) instead of, or in addition to, Baxter International's during the scoping process.").

[32] *See, e.g.,* Deposition of Rod Russell, June 25, 2008 at 15:13-52:8; Deposition of Catherine Hyde, April 1, 2008 at 11:3-37:2.

generally tried to keep the number of source groups as low as possible to minimize development and testing efforts.[33] The figure below illustrates SAS's record of an SAP TN source group division for two SQR objects for the CSS-TN-0103076718 Fix:

Development

Release	Object Type	Object Name	Clients	Comments
7.02	SQR	CTX910RP.SQR	RHI	
7.02	SQR	CTX915R.SQR	RHI	
8 SP1	SQR	CTX910RP.SQR	BAX,GVR	
8 SP1	SQR	CTX915R.SQR	BAX, GVR	
8.3 SP1	SQR	CTX910RP.SQR	FCS, FLI, TSU, WEN	
8.3 SP1	SQR	CTX915R.SQR	FCS, FLI, TSU, WEN	
8.8 SP1	SQR	CTX910RP.SQR	CCO, WMI	
8.8 SP1	SQR	CTX915R.SQR	CCO, WMI	

Figure 8: Sample Source Group Division from SAS (CSS-TN-0103076718)

e) Step 5: Develop the Fix

147. SAP TN generally used one Environment per source group for development in order to create a common set of Fix Objects to deliver to its other customers in the same source group.[34] SAP TN would copy the modified common Fix Objects for each source group to a central location, most often called development staging for the testing team.[35] Copies of the modified Fix Objects from one Environment were ultimately delivered to each customer in the source group.[36]

f) Step 6: Test the Fix

148. SAP TN would frequently test a CSM Fix in one Environment per source group.[37] The assigned tester would access the copies of the Fix Objects that had been saved to development staging, apply them to the chosen testing Environment (often a different Environment than the development Environment), and run any processes called for by the test plan to ensure the Fix addressed the issue as expected.[38] These tests were

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[33] *See, e.g.,* Deposition of Catherine Hyde, February 12, 2009 at 122:23-127:2 (SAP TN employees tried "to identify as large a group of clients as possible who would receive the same fix") and (if a "group of clients was determined to be in the same source group, then the objects for a fix would be developed initially in one environment and delivered to the clients within that source group."); Plaintiffs' Deposition Exhibit 1270 ("Grouping clients together in this manner can speed up our development.").

[34] *See, e.g.,* Deposition of Rod Russell, June 25, 2008 at 15:13-52:8; Deposition of Melissa Garcia, July 30, 2008 at 49:18-59:11; ("Ultimately, . . . [a single] SQR in that development prep folder . . . would be copied and applied to different clients' environments.") Deposition of Shelley Nelson, April 18, 2008 at 295:19-297:19; Deposition of Matthew Bowden, December 5, 2008 at 300:21-303:7.

[35] *See, e.g.,* Deposition of Larry Garcia, June 25, 2008 at 8:4-33:9; Deposition of Rod Russell, June 25, 2008 at 75:24-99:18; Deposition of Wanda Jones, November 18, 2009 at 48:17-58:8; Plaintiffs' Deposition Exhibit 1448.

[36] *See, e.g.,* Deposition of Shelley Nelson. April 18, 2008 at 295:19-297:19; Deposition of Melissa Garcia, July 30, 2008 at 52:22-59:11; Deposition of Wanda Jones, November 18, 2009 at 48:17-58:8; Plaintiffs' Deposition Exhibit 1448.

[37] *See, e.g.,* Deposition of Kim Martinez, October 21, 2009 at 79:11-82:6; Plaintiffs' Deposition Exhibit 1192; Deposition of Larry Garcia, June 25, 2008 at 17:22-20:17.

[38] *See, e.g.,* Deposition of Larry Garcia, June 25, 2008 at 8:4-33:9; Deposition of Melissa Garcia, July 20, 2008 at 71:5-73:13; Deposition of Kim Martinez, October 21, 2009 at 72:15-80:10; Deposition of Wanda Jones, November 18, 2009 at 18:4-20:21; 48:17-58:8; Plaintiffs' Deposition Exhibit 1448.

often carefully documented. [39]   If running the test produced output, then SAP TN would typically compare the output from the tests in different Environments across releases as an additional quality check.[40]

149.   The figure below shows a portion of the SAS Master Fix Record for the CSS-TN-0409075014 Fix, and reflects the one Environment per release or source group chosen for testing.[41]

Figure 9: Sample Testing Assignments from SAS (CSS-TN-0409075014)

g) Step 7: Bundle and Deliver the CSM Fixes

150.   SAP TN's final step in the CSM was to assemble copies of the developed Fix Objects in the central development staging area as Bundles for each customer.[42]

151.   To combine multiple DAT files from different Fixes in a Bundle, SAP TN would generally use one "DATM" Environment per release to combine the data from the different Fixes for each customer. SAP TN testified this was "more convenient" than using each customer's Environment individually.[43]

152.   SAP TN would usually test each Bundle, making multiple copies of Environments. These processes are reflected in the two tables below.

153.   The table below shows multiple copies of Environments being restored to test the June 2006 Bundle.[44]

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[39] *See, e.g.*, Deposition of Wanda Jones, November 18, 2009 at 23:9-23.

[40] *See, e.g.,* Deposition of Larry Garcia, June 25, 2008 at 8:4-33:9; Deposition of Kim Martinez, October 21, 2009 at 72:15-80:10.

[41] Deposition of Kim Martinez, October 21, 2009 at 57:16-94:17; Plaintiffs' Deposition Exhibit 1701A.

[42] *See, e.g.*, Deposition of Catherine Hyde, May 12, 2009 at 91:3-105:15; Deposition of Rod Russell, June 25, 2008 at 15:13-52:8, 114:19-128:17.

[43] *See, e.g.,* Deposition of Catherine Hyde, April 2, 2008 at 72:13-90:7.

[44] *See also* Deposition of Kim Martinez, October 21, 2009 at 124:2-135:15; Plaintiffs' Deposition Exhibits 1705, 1706.

RESTORE_ID	TARGET_ENV	SOURCE_ENV	BACKUP_FILENAME	RESTORE_DATETIME	DESCR PTION	PERFORMED_BY
699	H881CHSO	H881CHSO	H881CHSO_20060330_0812	5/30/2006 9:27	For PY06JUN Bundle Testing	mhosalli
700	H881DDMO	H881DDMO	H881DDMO_20060519_1518	5/30/2006 11:56	For PY06JUN Bundle Testing	mhosalli
701	H831RWCM	H831RWCM	H831RWCM_20060413_1409	5/30/2006 13:00	For PY06JUN Bundle Testing	mjahrsdoer
702	H831TA M	H831TA M	H831TA M_20060403_1505	5/30/2006 14:00	For PY06JUN Bundle Testing	mjahrsdoer
703	H751COAM	H751COAM	H751COAM_20060405_1459	5/30/2006 14:30	For FY06JUN Bundle Testing	mjahrsdoer
704	H751TPAM	H751TPAM	H751TPAM_20060405_1513	5/30/2006 16:00	For FY06JUN Bundle Testing	mjahrsdoer
705	H881KCMO	H881KCMO	H881KCMO_20060418_1346	5/30/2006 15:30	For py06JUN Bundle Testing	mhosalli
706	H881PCAO	H881PCAO	H881PCAO_20060328_1145	5/30/2006 16:00	For py06JUN Bundle Testing	mhosalli
707	H831CBRO	H831CBRO	H831CBRO_20060331_1648	5/31/2006 8:46	For PY06JUN Bundle Testing	mhosalli
709	H881WMIO	H881WMIO	H881WMIO_20060419_1730	5/31/2006 10:14	for PY06JUN Bundle Testing	mhosalli
710	H801RRNO	H801RRNO	H801RRNO_20060330_1605	5/31/2006 12:00	For PY06JUN Bundle Testing	mjahrsdoer
711	H830FLIO	H830FLIO	H830FLIO_20060403_1448	5/31/2006 13:00	For PY06JUN bundle testing	mjahrsdoer
712	H831ARMO	H831ARMO	H831ARMO_20060421_0931	5/31/2006 14:00	For PY06JUN Bundle Testing	mjahrsdoer
713	H831SPCO	H831SPCO	H831SPCO_20060418_1530	5/31/2006 14:54	For PY06JUN Bundle Testing	mhosalli
714	H751BRHO	H751BRHO	H751BRHO_20060428_1354(DB) H751BRHO_20060425_1606(PSH OME)	5/31/2006 16:02	For PY06JUN Bundle Testing	mhosalli
715	H831HIIO	H831HIIO	H831HIIO_20060403_1409	5/31/2006 16:30	For PY06JUN Bundle Testing	mjahrsdoer
716	H751EDEO	H751EDEO	H751EDEO_20060405_0950	5/31/2006 16:55	For PY06JUN Bundle Testing	mhosalli
717	H831FCSO	H831FCSO	H831FCSO_20060518_2209	5/31/2006 15:30	For PY06JUN Bundle Testing	mjahrsdoer
718	H751PHSO	H751PHSO	H751PHSO_20060501_1245	6/1/2006 10:00	For PY06JUN Bundle Testing	mjahrsdoer
719	H751TELO	H751TELO	H751TELO_20060418_1154	6/1/2006 10:00	For PY06JUN Bundle Testing	mjahrsdoer
720	H751NCLO	H751NCLO	H751NCLO_20060428_1052	6/1/2006 10:19	For PY06JUN Bundle Testing	mhosalli
721	H751SBHO	H751SBHO	H751SBHO_20060425_1737	6/1/2006 11:43	For PY06JUN Bundle Testing	mhosalli
724	H881EBMO	H881EBMO	H881EBMO_20060418_1620	6/8/2006 11:27	Before PY06JUN applied	nvuong
725	H801CAGO	H801CAGO	H801CAGO_20060426_1022	6/8/2006 12:35	Before PY06JUN applied	nvuong
726	H831BLSD	H831BLSD	H831BLSD_20060414_1342	6/8/2006 12:33	For PY06JUN Bundle Testing	mhosalli
727	H831ARMO	H831ARMO	H831ARMO_20060421_0931	6/8/2006 14:39	restored for py06jun bundle testing	mjahrsdoer
728	H751COAM	H751COAM	H751COAM_20060405_1459	6/8/2006 14:00	restored for py06jun bundle testing	mjahrsdoer
729	H751ACTM	H751ACTM	H751ACTM_20060404_1648	6/8/2006 13:50	restored for py06jun bundle testing	mjahrsdoer
730	H831RWCM	H831RWCM	H831RWCM_20060413_1409	6/8/2006 13:45	restored for py06jun bundle testing	mjahrsdoer
731	H831ACEM	H831ACEM	H831ACEM_20060417_1227	6/8/2006 13:35	restored for py06jun bundle testing	mjahrsdoer
732	H801QGIS	H801QGIS	H801QGIS20060330_1511	6/8/2006 14:21	For PY06JUN Bundle Testing	mhosalli
733	HG702CSS	HG702CSS	HG702CSS_20060426_1640	6/8/2006 15:36	restored py06jun bundle testing	mjahrsdoer
734	H881COHM	H881COHM	H881COHM_20060329_1456	6/8/2006 16:32	restore for py06jun bundle testing	mjahrsdoer
737	HR702CSS	HR702CSS	HR702CSS_20060413_1640	6/8/2006 23:43	Restore for PY06JUN Bundle Testing	mhosalli
738	H881KCMO	H881KCMO	H881KCMO_20060418_1346	6/9/2006 9:31	For PY06JUN Bundle Testing(2nd restore)	mhosalli
739	H751EDEO	H751EDEO	H751EDEO_20060405_0950	6/9/2006 11:36	For PY06JUN Bundle Testing (after Kristin's test)	mhosalli
742	H751COFO	H751COFO	H751COFO_20060405_1622	6/15/2006 10:54	For PY06JUN Bundle Testing	mhosalli

Table 6: Environment Backups for Bundle Testing PY06 JUN in BakTrak

154.   The table below shows multiple backup copies being made after the June 2006 Bundle has been tested and applied to the Environment.[45]

BCK_ID	ENVIRONMENT	FILENAME	DATE_TIME	DESCRIPTION	PERFORMEDBY	FORMAT
1401	H801QGIS	H801QGIS_20060613_0806	6/12/2006 8:06	PY06JUN Bundle Applied & Tested	mhosalli	.zip
1391	H881PCAO	H881PCAO_20060612_0910	6/12/2006 9:10	PY06JUN Applied & Tested	mhosalli	.zip
1392	H881WMIO	H881WMIO_20060612_1010	6/12/2006 10:10	PY06JUN Applied & Tested	mhosalli	.zip
1394	H881DDMO	H881DDMO_20060612_1052	6/12/2006 10:52	PY06JUN Applied & Tested	mjahrsdo	.gz
1395	H881COHM	H881COHM_20060612_1055	6/12/2006 10:55	PY06JUN Applied & Tested	mjahrsdo	.zip
1393	H881CHSO	H881CHSO_20060612_1120	6/12/2006 11:20	PY06JUN Applied & Tested	mhosalli	.zip
1396	H881KCMO	H881KCMO_20060612_1322	6/12/2006 13:22	PY06JUN Applied & Tested	mhosalli	.zip
1405	H801CAGO	H801CAGO_20060614_1104	6/14/2006 11:00	PY06JUN Applied & Tested	mjahrsdo	.zip
1407	H831SPCO	H831SPCO_20060615_0900	6/15/2006 9:00	PY06JUN Bundle Appplied & Tested	mhosalli	.zip
1409	H831HHSO	H831HHSO_20060615_0858	6/15/2006 10:40	PY06JUN Applied & Tested	mjahrsdo	.gz
1410	H831TAIM	H831TAIM_20060615_1006	6/15/2006 11:00	PY06JUN Applied & Tested	mjahrsdo	.zip
1416	H751COAM	H751COAM_20060616_1530	6/16/2006 16:00	PY06JUN Applied & Tested	mjahrsdo	.zip
1421	H831OLNI	H831OLNI_20060619_0847	6/19/2006 8:47	PY06JUN Applied & Tested	mhosalli	.zip
1419	H751COFO	H751COFO_20060619_0851	6/19/2006 9:15	PY06JUN Applied & Tested	mjahrsdo	.gz
1420	H831PASO	H831PASO_20060619_0922	6/19/2006 9:52	PY06JUN Applied & Tested	mjahrsdo	.gz
1422	H831BLSD	H831BLSD_20060619_1132	6/19/2006 11:32	PY06JUN Applied & Tested	mhosalli	.zip
1425	HG751CSS	HG751CSS_20060620_1121	6/20/2006 11:21	After PY06JUN applied	nvuong	.zip
1426	HR751CSS	HR751CSS_20060620_1128	6/20/2006 11:28	After PY06JUN applied	nvuong	.zip
1427	H751EDEO	H751EDEO_20060620_1141	6/20/2006 11:41	PY06JUN Applied and Tested	mhosalli	.zip
1428	H751ACTM	H751ACTM_20060620_1144	6/20/2006 11:44	After PY06JUN applied	nvuong	.zip
1429	H751BRHO	H751BRHO_20060620_1203	6/20/2006 12:03	After PY06JUN applied and tested	nvuong	.zip
1430	H751COFO	H751COFO_20060620_1233	6/20/2006 12:33	PY06JUN applied and tested	nvuong	.zip
1440	H751SBHO	H751SBHO_20060620_1247	6/20/2006 12:47	PY06JUN Applied & Tested	mjahrsdo	.gz
1431	H751PHSO	H751PHSO_20060620_1302	6/20/2006 13:02	PY06JUN Applied & Tested	mhosalli	.zip
1433	HR702CSS	HR702CSS_20060620_1237	6/20/2006 13:21	PY06JUN Applied & Tested	mjahrsdo	.zip
1434	HG702CSS	HG702CSS_20060620_1242	6/20/2006 13:32	PY06JUN Applied & Tested	mjahrsdo	.zip
1432	H751TELO	H751TELO_20060620_1140	6/20/2006 13:48	PY06JUN Applied & Tested	mjahrsdo	.gz
1435	HG751ANC	HG751ANC_20060620_1401	6/20/2006 14:01	PY06JUN Applied & Tested	mhosalli	.zip
1436	H751CCW	H751CCW_20060620_1403	6/20/2006 14:03	PY06JUN Applied & Tested	mhosalli	.zip
1438	H751TPAM	H751TPAM_20060620_1452	6/20/2006 14:52	PY06JUN Applied & Tested	mhosalli	.zip
1441	H751ICFM	H751ICFM_20060621_1401	6/21/2006 14:01	PY06JUN Applied & Tested	mjahrsdo	.zip
1443	H831CBRO	H831CBRO_20060622_0831	6/22/2006 8:31	PY06JUN Applied & Tested	mhosalli	.zip
1444	H831TSUM	H831TSUM_20060622_1137	6/22/2006 11:37	PY06JUN Applied & Tested	mhosalli	.zip
1449	H831ARMO	H831ARMO_20060623_0950	6/23/2006 9:50	PY06JUN Applied & Tested	mjahrsdo	.gz
1447	H831STAO	H831STAO_20060623_1117	6/23/2006 11:17	PY06JUN Applied & Tested	mhosalli	.zip
1452	H801BGPO	H801BGPO_20060623_1249	6/23/2006 12:49	PY06JUN Applied & Tested	mjahrsdo	.gz
1448	H831LFSM	H831LFSM_20060623_1339	6/23/2006 13:39	PY06JUN Applied & Tested	mhosalli	.zip
1450	H830FLIO	H830FLIO_20060623_1649	6/23/2006 16:49	PY06JUN Bundle Applied & Tested	mhosalli	.zip
1451	H801SPLO	H801SPLO_20060626_0840	6/26/2006 8:40	PY06JUN Applied and Tested	mhosalli	.zip
1460	H831RWCM	H831RWCM_20060627_1120	6/27/2006 11:20	PY06JUN Applied & Tested	mjahrsdo	.zip
1459	H831FCSO	H831FCSO_20060627_1134	6/27/2006 11:34	PY06JUN Applied & Tested	mjahrsdo	.gz
1458	H831SPSM	H831SPSM_20060627_1324	6/27/2006 13:24	PY06JUN Bundle Applied & Tested	mhosalli	.zip
1461	H831HIIO	H831HIIO_20060627_1350	6/27/2006 13:50	PY06JUN Bundle Applied& tested	mhosalli	.zip
1464	H801RRNO	H801RRNO_20060628_0819	6/28/2006 8:19	PY06JUN Applied & Tested	mhosalli	.zip
1475	H702RHIM	H702RHIM_20060705_1307	7/5/2006 13:07	PY06JUN Applied & Tested	mhosalli	.zip

Table 7: Environment Backups for Application of PY06 JUN in BakTrak

155.   The chart below, located in a file on SAP TN's systems called "North American Regulatory Process" in the directory known as "Consultant Docs and Templates" summarizes the CSM process, described above, and generally conforms to the results of Mandiant's investigation and analysis. It shows the customers being identified to receive each Fix, the customers being divided into source groups for "Development Common Code," each source group's Fix being tested once, and then finally a copy of the "Common Code" being delivered to each customer.

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[45] *See also* Deposition of Kim Martinez, October 21, 2009 at 124:2-135:15.
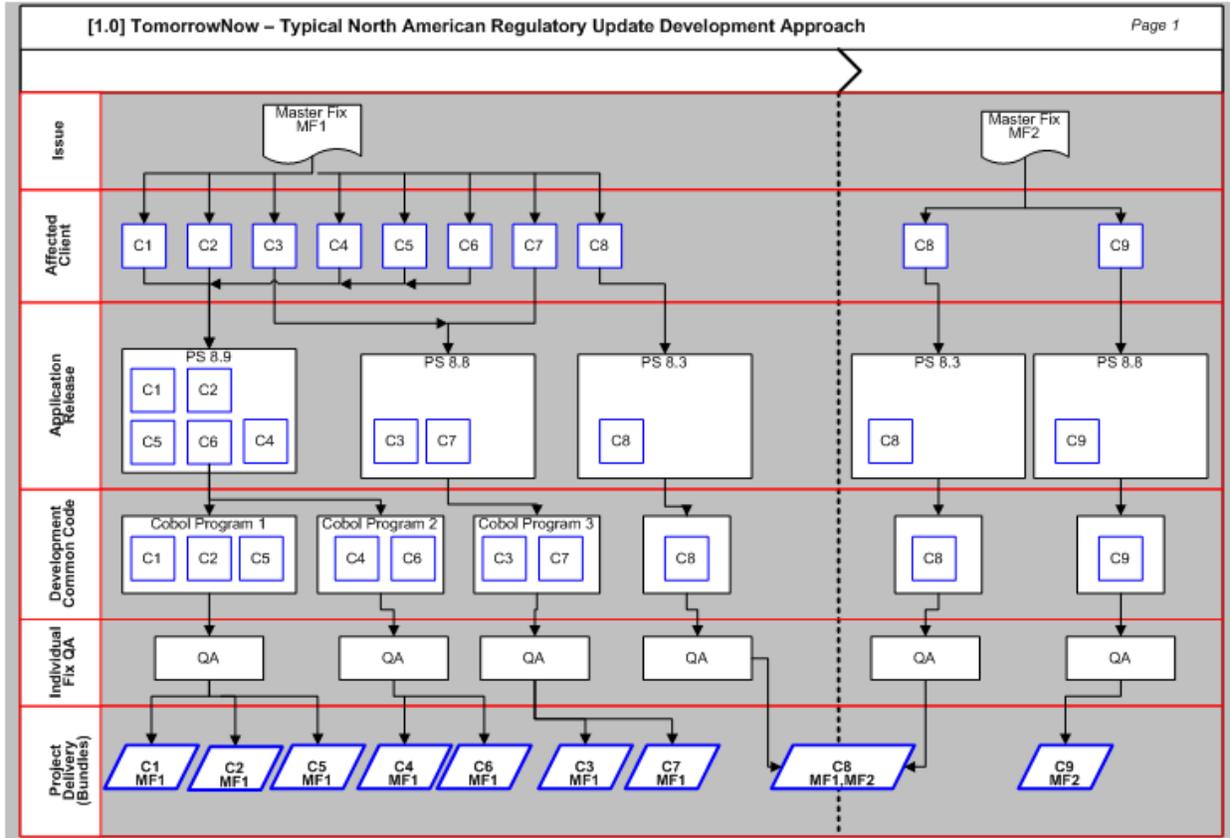
Table 8: SAP TN's North American Regulatory Process[46]

156.   In summary, SAP TN's CSM depended on repeated Cross-use of Oracle Environments across customer groups and without regard to licensing terms. After creating Environments for use for similar groups of customers, SAP TN would typically apply downloads to, test, and back up the Environments. After determining what regulatory issues needed to be addressed for the Fix, SAP TN would divide the affected customers into source groups, develop and test the Fix in Environments, and finally Bundle the Fix and deliver it to the source groups. The RSM and CSM were fundamentally the same from a Fix generation and Environment use perspective. In both models, SAP TN leveraged multiple copies of Oracle Enterprise Application Software to Cross-use in support of multiple customers.

C.   SAP TN's COPYING AND USE OF JD EDWARDS SOFTWARE

157.   SAP TN relied on JD Edwards Local Environments, created from Oracle Enterprise Application Software obtained from customers, to support multiple other customers, according to the testimony and documents produced by Defendants.[47]

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[46]   *See* Data Warehouse image TN-FS01_F, "Consultant Docs and Templates\Fix Delivery Work Documents\Development Process Documentation\ProcessDocuments\Development Process Documentation." Former SAP TN employee Wanda Jones testified that this chart, as well as the description of it in SAP TN's documents, "generally describe[s] the fix, the regulatory fix delivery process while [she was] at TomorrowNow." Deposition of Wanda Jones, November 18, 2009 at 80:22-88:15; Plaintiffs' Deposition Exhibit 1736; *see also* TN-OR00704882-892.

158.   SAP TN used its JD Edwards Local Environments in a variety of ways in addition to Fix development. For instance, SAP TN employees testified that they used the Environments to troubleshoot or debug issues reported by customers.[48] Employees further testified that they Cross-Used the JD Edwards Local Environments to provide this support, for instance by using the Environments as "research" tools, or as a "sandbox environment to learn the product."[49] As one SAP TN engineer testified, it was "likely" that he used at least one of SAP TN's JD Edwards Environments "from time to time," and "until the directive came down . . . [at least one JD Edwards Environment] would probably be used frequently" in this way.[50]

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[47] *See, e.g.,* Deposition of Mark Kreutz, February 19, 2008 at 8:19-36:10, 62:15-93:14, 106:11-126:2; Plaintiffs' Deposition Exhibits 45, 54, and 55.

[48] *See, e.g.,* Deposition of Mark Kreutz, October 30, 2007 at 194:14-197:7.

[49] *See, e.g.,* Deposition of Mark Kreutz, October 30, 2007 at 198:2-199:6, 201:12-21; Deposition of Mark Kreutz, February 19, 2008 at 60:19-62:14; Plaintiffs' Deposition Exhibit 51 (showing use of the "Koontz Wagner" Environment to support customer Eriez); Deposition of Pete Surette, June 19, 2009 at 83:10-86:12 (re "sandbox").

[50] *See, e.g.,* Deposition of Pete Surette, June 19, 2009 at 28:25-30:5; 86:13-88:10; *see also* Deposition of Mark Kreutz, February 19, 2008 at 48:5-49:5.

VI. CONCLUSION 1: SAP TN ENGAGED IN MASS DOWNLOADING FROM AND IMPROPER ACCESS TO ORACLE SYSTEMS

159.   The technical support services that Oracle makes available on its support websites for its validly-licensed customers consist of Updates, patches, and Fixes to each family of Oracle Enterprise Application Software, as well as instructional and documentary-based support materials. Customers and their agents typically apply the support downloads to their Oracle Enterprise Application Software; the same support materials are also generally incorporated into the next Oracle Enterprise Application Software release or version that Oracle makes available to its customers. The documentary and knowledge management support materials typically answer frequently asked questions and provide other technical instructions needed for the customer to efficiently run and maintain their Oracle Enterprise Application Software. SAP TN downloaded all types of SSMs for Oracle's PeopleSoft, JD Edwards and Siebel product lines.

A. ORACLE'S LOGS REFLECT SUBSTANTIAL ACTIVITY FROM TWO SAP TN IP ADDRESSES

160.   Mandiant determined that there were two known IP addresses registered to SAP TN in Bryan, Texas contained within Oracle's reverse proxy log data. The IP addresses were:

- 209.189.228.98
- 209.189.228.126

161.   To determine the extent of SAP TN's download activity, Mandiant reviewed numerous log files provided by Oracle, including:

- Reverse proxy logs (available starting September 1, 2006)[51]
- SupportWeb and E-Business logs (available starting January 1, 2004)[52]

1. Reverse Proxy Logs

162.   Activity relating to 209.189.228.98 was observed in reverse proxy logs starting September 1, 2006, the first day of available logs. On November 11, 2006, approximately forty minutes after activity ceased from 209.189.228.98, activity originating from 209.189.228.126 was observed. The last known activity from 209.189.228.126 was observed on May 8, 2008.

163.   According to the Oracle logs, almost 2.5 terabytes of data was accessed or downloaded by the two known SAP TN IP addresses between September 1, 2006 and April 8, 2007. The information is broken down by the names of the Oracle reverse proxy systems that were used to facilitate connections to Customer Connection below. Table 9, derived using the log analytics tool Sawmill, is included in eAppendix - ORCLX-MAN-000210. Approximately 2.5 terabytes of data is also reflected in the Reverse Proxy Log database reduced by known SAP TN IP addresses. *See* ORCLX-MAN-000320[53]:

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[51] See ORCL00009434; ORCLX-MAN-000217. The SAP TN IP address was confirmed by a review of the log files indicating specific SAP TN server names in Section VI and review of Arin.net and whois.net referencing an internet search provider in Bryan, TX. *See* ORCLX-MAN-000209.

[52] See ORCL00595548.

[53] Running and summing queries 19 and 20 on ORCLX-MAN-000324 yields 992,420 files downloaded by SAP TN. *See also* ORCLX-MAN-000312 and ORCLX-MAN-000313.

Oracle Reverse Proxy System Name	Size in Gigabytes
SUN145	636.28
SUN146	334.95
SUN147	739.64
SUN148	744.78
Total	**2455.65**

Table 9: Summary of Downloads by Oracle Reverse Proxy System

2. SAP TN Used at Least 37 Different Systems to Access Oracle Websites

164. The Oracle reverse proxy logs indicated 37 unique SAP TN computers were used to download content from Customer Connection by SAP TN. In addition to the 37 unique system names, fifty unique IP addresses were associated with those systems. The following machine names were identified:

SAP TN Server Machines			
CNU51405KW	dcdl08	dcdl18	LeasedDesktop27
CO-AGhosh-L01	dcdl09	DCDL19	PC175064711631
COi808745L01	dcdl10	dcdl20	tn-dl02
Dcdevtestpc	dcdl11	dcjddev02	TN-DL03
dcdl01	dcdl12	dcjdent02	TN-DL08
dcdl02	dcdl13	DCTEMPDWLD01	tn-wts01
dcdl03	dcdl14	hqawoodspc01	TNL-02
dcdl05	dcdl15	HQi809240L02	
dcdl06	dcdl16	jd-dev03	
dcdl07	dcdl17	L34217Z	

Table 10: SAP TN Server Names that Accessed Oracle's Customer Connection

3. Analysis of Website Hits

165. Analysis was performed on the reverse proxy logs by examining the number of "hits" to the Customer Connection website by SAP TN. A hit is signified as an incoming request to the website. The goal was to determine periods of relatively heightened activity by SAP TN. Overall, Mandiant determined over 18,231,750 hits from the SAP TN IP addresses. See eAppendix - ORCLX-MAN-000210. The following graph represents the number of hits per day to Customer Connection by SAP TN. These hits also show that SAP TN had its largest recorded day of website hits shortly after Oracle filed this Action. [54] Figure 10 is a graphical representation of the Oracle Proxy Log files derived from Sawmill. The Reverse Proxy Log database reduced by known SAP TN IP addresses shows 18,106,180 hits from SAP TN IP addresses. *See* ORCLX-MAN-000320.

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[54] Defendants have stated that they do not have any information that would allow them "to admit or deny" when their highest volume of downloads from Customer Connection for 2007 occurred. Defendants' Responses to Plaintiffs' Fifth Set of Requests for Admission, No. 176. Mandiant reserves the right to amend or supplement its conclusions, report, or both, if Defendants later provide any information contradicting that statement.
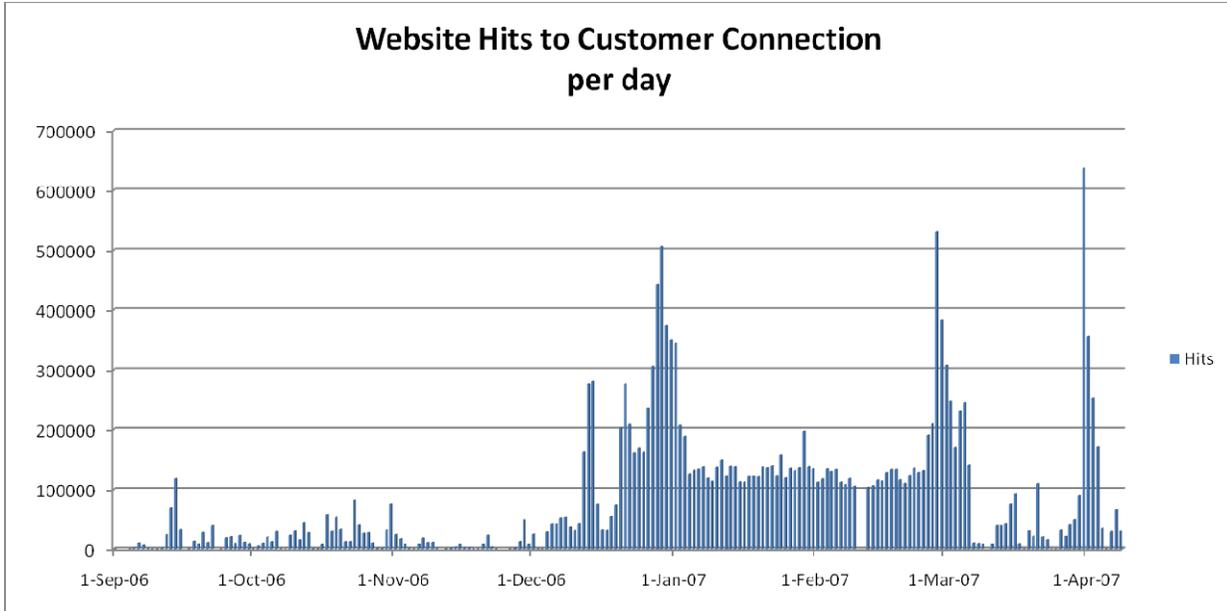
Figure 10: SAP TN Website Hits to Customer Connection per Day Based on Reverse Proxy Logs

4. Access to Siebel's SupportWeb

166.   Activity relating to 209.189.228.126 was observed in SupportWeb and E-Business logs from December 1, 2006 to February 15, 2007. Activity relating to 209.189.228.98 was observed in SupportWeb and E-Business logs from September 25, 2006 to November 30, 2006. See eAppendix – "ORCLX-MAN-000144."

167.   Mandiant's analysis reveals over 500,000 hits by two IP addresses associated with SAP TN between September 25, 2006 and February 15, 2007. The logs for this time period reveal over 2900 downloads of compressed files and PDFs. See eAppendix – "ORCLX-MAN-000143" and "ORCLX-MAN-000144."

File Type	Number of files downloaded
PDF	2462
ZIP	470
Total	2,932

Table 11: Summary of Downloads in Siebel SupportWeb Log Files

B. SAP TN PERFORMED MASS DOWNLOADING FROM ORACLE WEBSITES

168.   SAP TN downloaded Oracle SSMs by using approximately 20 download servers identified in the Data Warehouse as systems DCDL01 through DCDL20.[55] After downloading Oracle materials on each download server, SAP TN copied the SSMs to a central repository server identified as DCITBU01. The downloaded Oracle materials were also transferred to numerous other servers in SAP TN's infrastructure. In total, Mandiant found a total of over 4.8 terabytes, or 4,062,617 files identified as Oracle materials,

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[55] *See, e.g.,* Deposition of Peggy Lanford, September 22, 2009 at 78:7-80:12. *See also* SAP TN's Responses to Oracle Corp.'s First Set of Interrogatories, No. 11; SAP TN's Responses to Oracle Corp.'s First Set of Requests for Admission, Nos. 97-154.

downloaded by SAP TN (see eAppendix – "ORCLX-MAN-000218" and "ORCLX-MAN-000219")[56]:

169.   Mandiant also identified Software and Support Materials on PSNT01 and on various Siebel virtual machines hosted on TN-FS01. Specifically, using the same method to identify SSMs described in Appendix D, Mandiant identified 33,545 additional SSMs. See ORCLX-MAN-000356. Therefore, to date. Mandiant has identified 4,096,162 SSM files within the SAP TN infrastructure.

SAP TN System	Size GB	Number of Files
DCITBU01	4,351.99	3,296,812
TN-FS01	154.05	273,663
JDWSVR01	50.63	12,950
DCJDENT02	49.78	976
DCJDDEV03	49.78	975
DCJDWDEV01	20.86	9,646
DCPSTEMP01	4.28	42,768
DCPSTEMP02	3.32	24,888
HOMER1	3.14	30,956
YOGI	0.98	6,106
TempStore	0.94	1,941
PSDJDDEV02	0.52	578
PSDEV01	0.31	6,717
TNWTS01	0.14	2,915
DCWTS01	0.0065	130
SBLPROD03	0.000067	2
SBLPROD02	0.0000020	1
Aggregate of Download Servers	127.174	350,593
PSNT01	2.4	22,912
Aggregate of Siebel virtual machines[57]	.7	10,633
Total:	**4,821**	**4,096,162**

Table 12: Volume of Oracle SSMs Found Within the SAP TN Infrastructure Mandiant Reviewed

170.   As further discussed in Section E, below, additional evidence of SAP TN's downloading can be found in individual custodial productions. Mandiant has confirmed that more than 300,000 SSMs were present on the computers of four SAP TN employees. Mandiant was not permitted to review employees' individual computers in their entirety, so we could not determine the true number of SSMs present on employee computers at any given

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[56] Appendix D, Table 17, which reports 243,066 SSMs, is an analysis of MD5 hashes rather than metadata, and includes analysis of SSMs found on JDWSVR01, TNFS02, TEMPSTORE, and SAP TN's download servers not taken into account here. Table 12 is a snapshot of Mandiant's count of SSMs prior to the completion of all of our analysis. Therefore, we calculated the "Aggregate of Download Servers" count of SSMs with the metadata obtained during our remote review of the Data Warehouse (see ORCLX-MAN-000142).

[57] See ORCLX-MAN-000356, which provides the breakdown of the total SSMs found on each of the 24 Siebel virtual machines provided on hard drive TN-119.

time.[58] Furthermore, SAP TN employees have testified that they performed and then deleted downloads on a regular basis, including an estimated 1 million downloads obtained in the course of developing Titan, alone.[59] It is likely that millions of additional SSMs were downloaded and either deleted or never produced in this matter.

171.   The methodology employed by Mandiant to obtain this data is described in Appendix D. When not minimizing by file type, and by decompressing the archive files found on the DCITBU01 system, Mandiant identified over 9 million files on the DCITBU01 system alone (see ORCLX-MAN-000148):

DCITBU01	Size (GB)	Number of Files
DCITBU01 – Total Files not reduced by file type	4624.82	4,880,270
DCITBU01 Additional Files after Decompression	266.97	4,718,840
Total:	4891.79	9,599,110

Table 13: Total Number of Files on DCITBU01 After Decompression

C.   SAP TN IMPROPERLY ACCESSED THE ORACLE WEBSITES

172.   SAP TN accessed Oracle's password-protected support websites using automated downloading tools, inappropriate customer credentials and pre-textual customer information to take Oracle SSMs and download them to SAP TN's local systems.

1.   The Oracle Websites Were Password-Protected

173.   Certain of Oracle's support websites, including Customer Connection, and certain Oracle tools on those websites, were password-protected. The password protection and Terms of Use restricted access to a customer (or agent) with an active maintenance contract with Oracle.

To log onto Customer Connection, SAP TN accessed the log-in page, shown in a screenshot below.

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[58] Mandiant understands that SSMs on the computers of SAP TN employees not named as custodians in this matter would not have been produced. Mandiant similarly understands that, for the majority of employees, date-filtering and search-term filtering were used to exclude SSMs on employees' machines from production. See E-mail from Joshua L. Fuchs to John A. Polito, January 24, 2010, produced as ORCLX-MAN-000381 (admitting that ESUs on employees' computers would have been produced only "where identified through the use of Defendants' custodian production and review protocol, including the use of the extensive search terms agreed to by the parties.").

[59] See Deposition of John Ritchie, December 2, 2009 at 75:4-79:2.
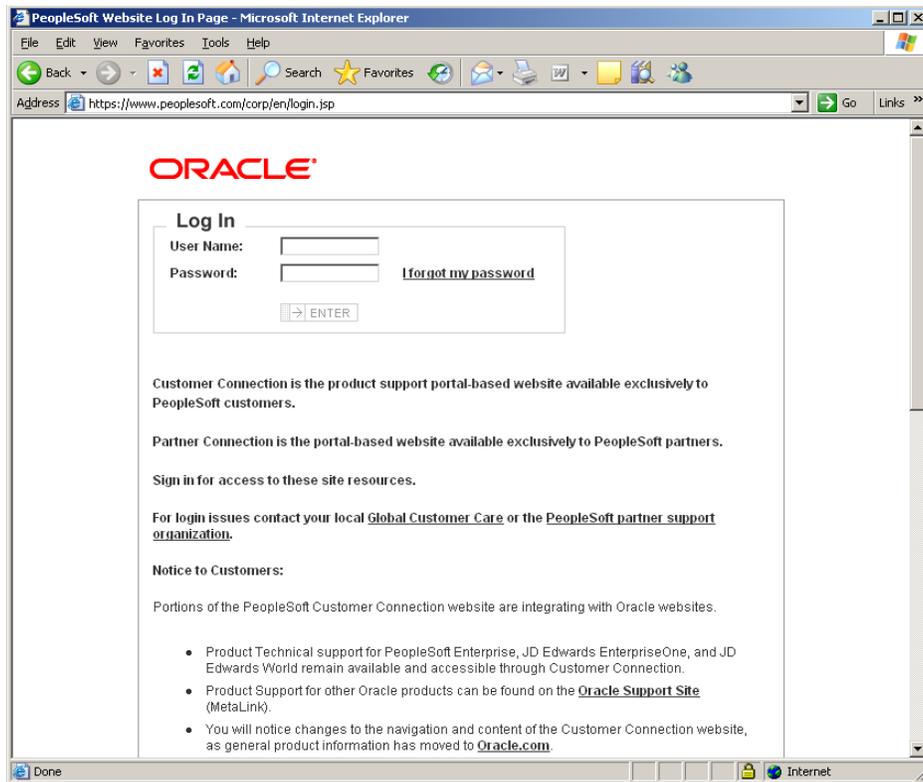
Figure 11: Customer Connection Log-In Page

Similarly, below is a screenshot of the log-in screen SAP TN accessed to use Oracle's Update Center:
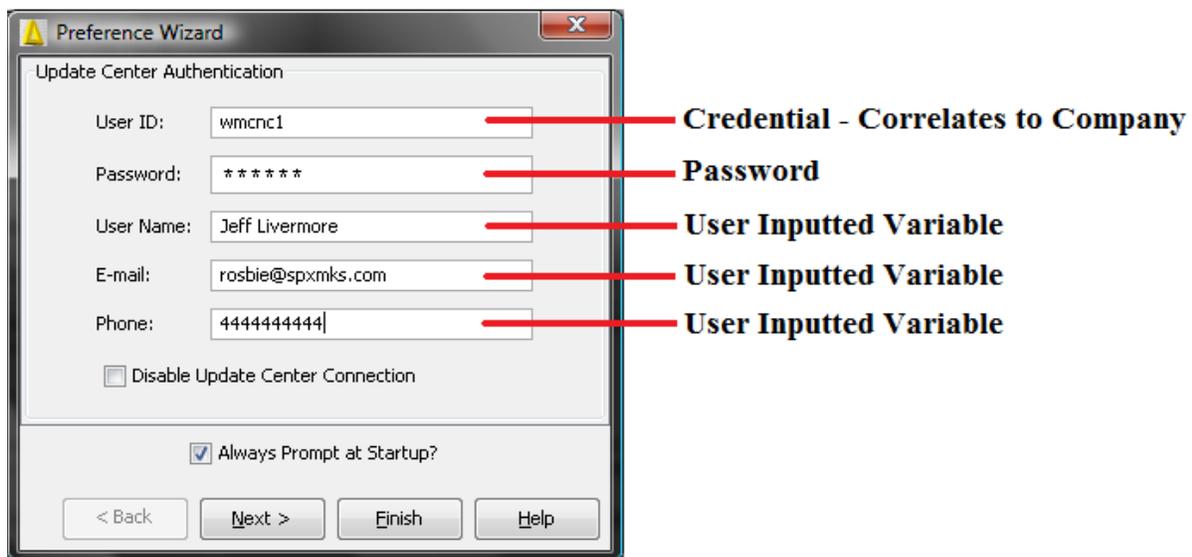
Figure 12: JD Edwards Change Assistant Tool Log-In

2. SAP TN's Use of Automated Downloading Tools

174. SAP TN used its knowledge of Oracle's websites to develop and test automated downloading tools.[60] Over time, SAP TN developed a tool known as Titan. SAP TN programmed Titan to allow automated, mass downloading from Oracle without regard to any license restrictions a customer may have.[61] SAP TN employed Titan to "crawl" Customer Connection, and to locate and retrieve materials that not even paying customers would ordinarily reach through standard searching. The nature of Titan and the evidence of its use, including as reflected in Oracle's logs, indicates to me an intentional, knowing effort to bypass any access or use restrictions and perform mass downloading from Customer Connection.

175. SAP TN also developed and used Titan and other automated tools to download Siebel SSMs from SupportWeb.[62] As with SAP TN's other downloading tools, the tools for downloading Siebel SSMs "crawled" SupportWeb, collecting the broadest possible range of materials.[63] The nature of these tools and the evidence of their use indicate to me an intentional, knowing effort to bypass any access or use restrictions and perform mass downloading from SupportWeb.[64]

176. SAP TN developed and tested these automated downloading tools by accessing Oracle's customer support websites using certain customers' credentials. As an example, if Oracle changed the layout of Customer Connection, then SAP TN would use one customer's credentials to access the site and modify Titan to function with the changed layout.[65]

177. For JD Edwards downloads, SAP TN also used Oracle's "Change Assistant" application, which allowed automated downloading.[66] These automated tools allowed SAP TN to conduct multiple downloading sessions using multiple sets of credentials on multiple machines simultaneously.[67]

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[60] *See, e.g.,* Defendants' Reponses to Plaintiffs' Second Set of Requests for Admission, Nos. 225-234 ("Defendants reasonably believe that at least one or more TomorrowNow employees likely accessed Customer Connection for the purpose of testing the "Titan" automated downloading program.").

[61] Deposition of John Ritchie, December 2, 2009 at 79:15-82:8.

[62] *See, e.g.*, Deposition of Jerry Jin, December 1, 2009 at 109:5-112:21 (discussing eServiceWalker and URL Tracker); *id.* at 122:11-123:19 (discussing eServiceWalker, URL Tracker and an "unnamed script . . . used to download public SR's"); *id.* at 133:17-142:12 (same); Plaintiffs' Deposition Exhibit 1800 (discussing the "Mass Downloader utility"); Deposition of John Ritchie, December 2, 2009 at 70:3-71:20 (discussing Titan for Siebel).

[63] *See* Deposition of Jerry Jin, December 1, 2009 at 136:10-19 (establishing that eServiceWalker incremented URLs); *id.* at 169:17-171:20 ("[B]y the using of newly developed eServiceWalker tool we now have the full set of MKS's customer facing SR's."); Deposition of John Ritchie, December 2, 2009 at 76:7-19 (discussing "Incrementing through the different downloads from the Oracle site").

[64] *See, e.g.*, Deposition of John Ritchie, December 2, 2009 at 72:18-74:11 (establishing that Ritchie "was never told" whose credentials he had been given for use in Titan, including with respect to Titan for Siebel); Plaintiffs' Deposition Exhibit 1800 ("The Mass Downloader utility can control bandwidth utilization. So during the day, we can set it to . . . a mere trickle . . . . [t]hen . . . drop the bandwidth limitation . . . overnight.").

[65] Deposition of Josh Testone, June 3, 2009 at 109:23-118:24, 98:4-103:23; Plaintiffs' Deposition Exhibits 1410, 1411, 1412; Deposition of Desmond Harris, October 9, 2009 at 119:10-123:25; Plaintiffs' Deposition Exhibit 1566; Deposition of Peggy Lanford, September 22, 2009 at 51:23-58:3; Plaintiffs' Deposition Exhibit 1637.

[66] Deposition of Pete Surette, June 19, 2009 at 34:24-37:24.

[67] Deposition of Josh Testone, June 3, 2009 at 83:20-94:9, 136:22-140:2; Deposition of Desmond Harris, October 9, 2009 at 106:24-108:13 ("It was – from what I remember, it was basically just made to speed the process up and simplify it. That's about it. It's click, click, click, go."); Defendants' Answer to Oracle's Fourth Amended Complaint, August 26, 2009 at ¶ 108 ("Defendants admit that some downloads were performed in rapid succession without real time human review of the materials being downloaded.").

178.	SAP TN's automated downloading tools, including Titan, permitted SAP TN to download multiple kinds of support materials from Oracle's customer support websites as quickly as possible.[68] While there are legitimate reasons to take large volumes of materials from Customer Connection or SupportWeb (such as a licensed customer downloading many items to which it is entitled), SAP TN used its tools to indiscriminately download millions of SSMs and numerous internal, confidential, draft, and expired customer support materials.[69]

179.	After the initial report submission date of November 16, 2009, Mandiant learned additional information regarding Titan based upon the deposition of John Ritchie on December 2, 2009. Ritchie's testimony provided, for the first time, a roadmap from Titan's developer's perspective, of the goals, activities and impacts of Titan as Ritchie actually implemented and observed them. This information changed the way Mandiant was able to assess Titan.

180.	SAP TN used Titan to automate the download process from Customer Connection to make it faster than typical human interaction by downloading documents simultaneously.[70] Simultaneous searching and downloading sometimes caused Titan to lose its connection to Oracle's Customer Connection as recorded in Titan log files.[71] The events recorded in the log files were errors connecting to the Customer Connection website. In order to continue the download process, Titan needed to be restarted by logging back into Customer Connection. Furthermore, Titan caused Customer Connection to become unavailable for authentications while simultaneous downloads were performed.[72]

181.	After reviewing Ritchie's testimony, Mandiant reviewed Data Warehouse and DCITBU01_G to identify Titan log files referencing the activity and errors described by Mr. Ritchie. The log files did not have a typical file extension of "*.log", and they were stored among the millions of downloaded files produced on DCITBU01 and other SAP TN servers. However, Mandiant was able to identify Titan log files by using the following methodology:

- Mandiant conducted a manual review of text files to find any files which might have been created by Titan in order to identify search criteria.
- Mandiant identified the unique keyword "Begin run at:" which is written to the Titan JDE log file each time the program starts.
- Mandiant performed a keywords search with the "Begin run at:" keywords on all files with a ".txt" extension on all image files listed in ORCLX-MAN-000141. Mandiant located 108 files which contained the "Begin run at:" string.
- Mandiant reduced the 108 identified files to 96 log files that contained the string "logfile" within the file name (See ORCLX-MAN-000347).

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[68] *See, e.g.,* Deposition of Josh Testone, June 3, 2009 at 83:20-94:9, 136:22-140:2; Deposition of Desmond Harris, October 9, 2009 at 106:24-108:13; Defendants' Answer to Oracle's Fourth Amended Complaint, August 26, 2009 at ¶ 108 ("Defendants admit that some downloads were performed in rapid succession without real time human review of the materials being downloaded."); Deposition of John Ritchie, December 2, 2009 at 77:20-79:2.

[69] *See, e.g.,* Deposition of Uwe Koehler, December 4, 2008 at 25:14-28:2, 194:24-203:22; Deposition of Uwe Koehler, December 5, 2008 at 70:21-75:22; Deposition of John Ritchie, December 2, 2009 at 65:14-82:19.

[70] See, e.g., Deposition of John Ritchie, December 2, 2009 at 47:7 – 47:25

[71] See, e.g., Deposition of John Ritchie, December 2, 2009 at 51:23 - 52:15

[72] See, e.g., Deposition of John Ritchie, December 2, 2009 at 52:16 – 53:19

182. After reviewing the contents of the 96 identified log files, Mandiant identified numerous messages that recorded an error where Oracle's Customer Connection Web site was not responding to Titan's requests to download files:

- "There was an error talking to the Support Server. Sleeping for 5 Seconds and will then try again. Error".

183. The error message was identified in 48 of the 96 Titan log files. Of the 48 Titan log files, 38 were unique based upon MD5 hash sum (See ORCLX-MAN-000359). Analysis was performed on the 38 unique identified files to determine the dates and numbers of error messages which occurred (See ORCLX-MAN-000346).
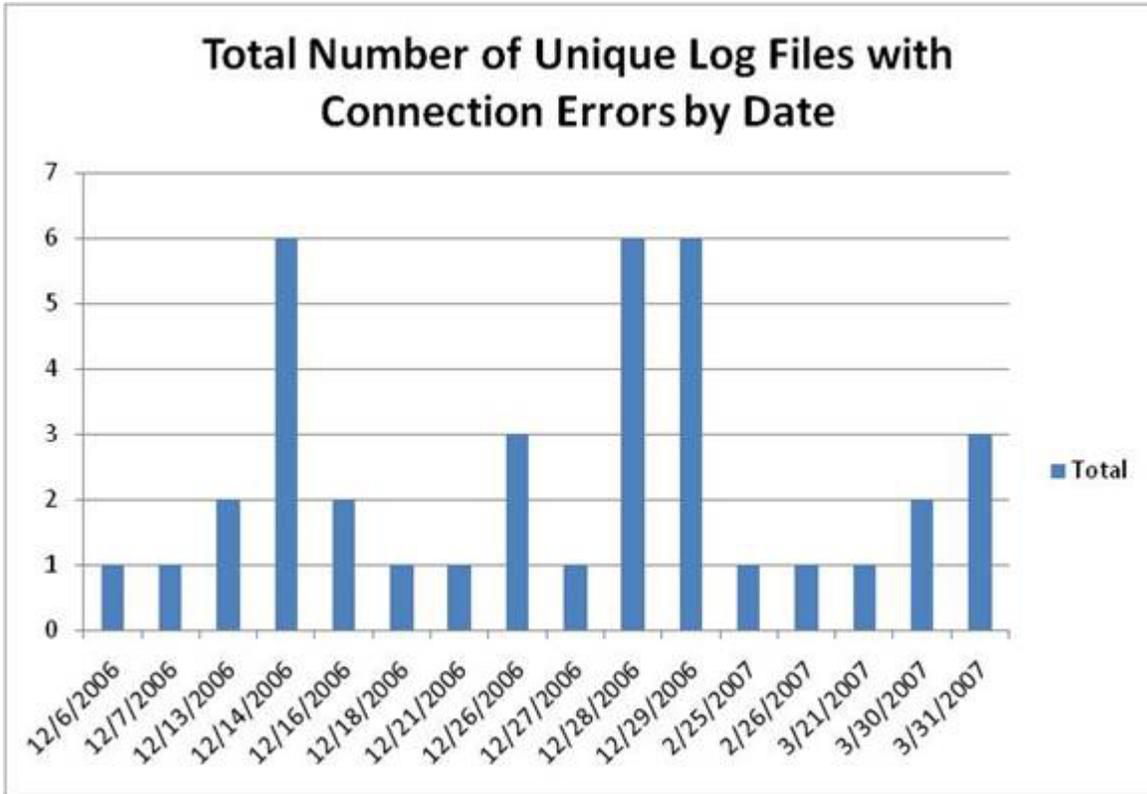
Figure A: Total Number of Unique Titan Downloader Log Files Found within Data Warehouse with Connection Errors

184. In order to determine the number of error messages contained in each file, Mandiant performed a search for the string "error talking." The results of the search can be found in ORCLX-MAN-000351. In total, Mandiant determined approximately 4,716 error messages were contained in the identified files. The following table represents the total number of files and error messages by day (Last Written Date of each Unique File):

Last Written Date of Log Files Containing Multiple Error Messages	Number of Unique Files Containing Error Messages per Last Written Date	Total Number of Error Messages per Last Written Date
12/6/2006	1	5
12/7/2006	1	344
12/13/2006	2	1397
12/14/2006	6	225

Last Written Date of Log Files Containing Multiple Error Messages	Number of Unique Files Containing Error Messages per Last Written Date	Total Number of Error Messages per Last Written Date
12/16/2006	2	131
12/18/2006	1	87
12/21/2006	1	4
12/26/2006	3	402
12/27/2006	1	93
12/28/2006	6	1311
12/29/2006	6	403
2/25/2007	1	52
2/26/2007	1	36
3/21/2007	1	4
3/30/2007	2	21
3/31/2007	3	201
TOTAL	**38**	**4716**

Table F: Unique Titan Downloader Log Files

185. Based upon the data depicted graphically in Figure 10 (Website Hits to Customer Connection per Day Based on Reverse Proxy Logs) in Section VI, above, and the creation dates of Titan log files identified with error messages, Mandiant believes the use of Titan coincides with elevated activity from SAP TN IP addresses.[73] In particular, Ritchie described an effort to run Titan at more than 15 threads, based on the instructions to him to make Titan take as much, as quickly, as he could.[74] When he observed that Titan, running this way, "crashed" the Oracle website, and he was not able to simultaneously log in to that website, he adjusted the Titan code to a maximum of 15 threads. Mandiant was unable to recover or identify any Titan log files generated during the initial period of Ritchie's observations (Summer 2006) because they were either deleted or never produced. Accordingly, Mandiant reviewed later Titan logs for additional evidence. Taking that review in combination with Ritchie's testimony, it appears more likely than not that the elevated activity, at least from the earlier period and quite possibly from the later periods of Titan use, caused Customer Connection to be unavailable for authentication for other customers logging in through the standard web portal when SAP TN was performing mass downloads using Titan. As noted, Ritchie observed firsthand that authentication was unavailable while Titan was attempting certain volumes of downloads simultaneously from the Oracle website.[75]

186. One example of the potential impact of Titan on Customer Connection can be identified in the Titan log file originally named "BU01\JDEUpdates&Fixes1-14\Single Files\Abitibi Consolidated\World\World A73\SAR Information\logfile.txt" (the "Abitibi log"). This log file shows Titan was executed on 12/27/2006 at 10:20:38 AM. The log activity shows that Titan authenticated, ran searches, parsed results, and downloaded files concurrently in multiple threads.

187. In the Abitibi log, the frequency of the message "There was an error talking to the Support Server. Sleeping for 5 Seconds and will then try again. Error – 00001" steadily increased, until this message occurred 281 times in a row within the log file. This error message indicates that Titan was initiating searches on Customer Connection, checking every 10 seconds for approximately 46 minutes with no successful activity (based on Titan's waiting 5 seconds after each search error + 5 seconds for the error to be

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[73] *See also* Deposition of Uwe Koehler, December 4, 2008, at 179:14-180:23 and December 5, 2008, at 54:21-56:23.

[74] *See* Deposition of John Ritchie, December 2, 2009 at 49:2-10.

[75] *See* Deposition of John Ritchie, December 2, 2009 at 52:16-54:4.

generated again). This log file shows that another Titan run began immediately again on 12/27/2006 at 11:45:07 AM, which demonstrates a SAP TN employee stopped Titan and restarted it based on the lack of response from Customer Connection. Titan logged into Customer Connection successfully at this time, but then generated the same "Error – 00001" six times (approximately 60 seconds with no successful activity). The SAP TN employee then restarted Titan again, likely with a different starting point for searching Customer Connection.

188.   The Abitibi log recorded that queries executed by Titan did not return results within 5 seconds. When this occurred, Titan continued to loop through a "wait for response" cycle until it received a response or until the program was halted. While the code to execute searches and parse results was single-threaded, the file download process was multi-threaded, with no maximum concurrent thread limit enforced for some versions of the program. In other words, once a file download was initiated, Titan requested additional web pages, parsed additional search results, and downloaded the results. When the downloads took a long time to complete, the number of concurrent threads accumulated. The effect of these accumulating threads for downloads, along with the continuous nature in which Titan made search requests, had a deleterious effect on the web server's ability to process a search query, present a complete set of results, or properly complete in-progress downloads. Therefore, under these conditions, the longer Titan ran, the worse Titan's effects would become.

189.   In summary, the roadmap provided by Ritchie, the Titan source code and the Titan log files together suggest that customers more than likely were not able to access Oracle websites as easily, or at all, while Titan was running.

3.   SAP TN's Use of Inappropriate Customer Credentials

190.   The Oracle reverse proxy logs revealed SAP TN used at least 72 different companies' credentials to access Customer Connection. A list was composed of first and last known access per customer name and credential in eAppendix – "ORCLX-MAN-000140" according to the identifiable fields contained within the logs.

191.   Mandiant determined that there were 74 unique credentials used by SAP TN reflected in the analyzed logs. However, some credentials were associated with multiple company names. For example, the credential "tomorrownow1" was associated with Allianz of America Inc., Channing L. Bete Company Inc., and Phelps Dodge Corporation. The following table shows examples of credentials used by SAP TN on behalf of multiple customers.

Start	End	Credential	Company Name
3/9/2007 7:36	3/15/2007 19:31	Aosmithtn	AO Smith Corporation
3/15/2007 10:33	3/15/2007 19:24	Aosmithtn	Dave & Buster's Incorporated
2/25/2007 17:40	2/25/2007 17:40	signon_user	Channing L. Bete Company Inc.
3/31/2007 8:39	3/31/2007 8:39	signon_user	TBC Corporation
3/26/2007 6:35	3/26/2007 8:04	signon_user	Westcon Group Inc.
2/21/2007 9:22	2/21/2007 9:22	tomorrownow1	Allianz of America Inc.
2/25/2007 10:08	2/25/2007 10:08	tomorrownow1	Channing L. Bete Company Inc.
2/16/2007 8:01	2/21/2007 9:22	tomorrownow1	Phelps Dodge Corporation

Table 14: Sample Credentials Associated with Multiple Companies

A list of all login credentials associated with each company name is listed in eAppendix – "ORCLX-MAN-000140."

192.   When developing and testing Titan, SAP TN employees relied upon hard-coded credentials stored in a Microsoft Access database.[76] Mandiant was able to identify ten Microsoft Access Databases within Data Warehouse, containing five sets of default credentials used to access Customer Connection. Table F below lists the 10 databases found on six different systems within the Data Warehouse:

Name	Hash Value	Stored Username	Stored Password	Full Path
PS_Download - Blank.mdb	83d5bf8a2c77542eea361e47bdca5da4	bbohannon	guitar3	DCDL04\C\RECYCLER\S-1-5-21-451233948-3539072813-3269319934-2527\TomorrowNow, Inc\PS Downloader\PS_Download - Blank.mdb
Titan - Blank.mdb	1336e632e0a8559d9263791adc370e20	bbohannon	guitar3	DCDL04\C\RECYCLER\S-1-5-21-451233948-3539072813-3269319934-2527\TomorrowNow\SS\Titan - Blank.mdb
PS_Download - Blank.mdb	668bfb1da63d4889f1ef2f17061e2e02	3366Now	2tomorrow2	DCDL06\C\RECYCLER\S-1-5-21-451233948-3539072813-3269319934-2527\TomorrowNow, Inc\PS Downloader\PS_Download - Blank.mdb
PS_Download - Blank.mdb	a6a4e175eb0b798faa912db2a65fd055	wongjl	starhub123	DCDL08\C\RECYCLER\S-1-5-21-451233948-3539072813-3269319934-2527\TomorrowNow, Inc\PS Downloader\PS_Download - Blank.mdb
Titan - Blank.mdb	933fcc105ad6cb911b2df4b21bd63e46	wongjl	starhub123	DCDL08\C\RECYCLER\S-1-5-21-451233948-3539072813-3269319934-2527\TomorrowNow\SS\Titan - Blank.mdb
PS_Download - Blank.mdb	99a129d772febdd058e25516973899c5	TomNowrpl	richpow123	DCDL09\C\RECYCLER\S-1-5-21-451233948-3539072813-3269319934-2527\TomorrowNow, Inc\PS Downloader\PS_Download - Blank.mdb

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[76] See Deposition of John Ritchie, December 2, 2009 at 65:14-69:17.

Titan - Blank.mdb	1336e632e0a 8559d926379 1adc370e20	bbohannon	guitar3	DCDL09\C\RECYCLER\S-1-5-21-451233948-3539072813-3269319934-2527\TomorrowNow\SS\Titan - Blank.mdb
PS Download - Blank.mdb	83d5bf8a2c77 542eea361e4 7bdca5da4	bbohannon	guitar3	DCDL10\C\RECYCLER\S-1-5-21-451233948-3539072813-3269319934-2527\TomorrowNow, Inc\PS Downloader\PS Download - Blank.mdb
Titan - Blank.mdb	1336e632e0a 8559d926379 1adc370e20	bbohannon	guitar3	DCDL10\C\RECYCLER\S-1-5-21-451233948-3539072813-3269319934-2527\TomorrowNow\SS\Titan - Blank.mdb
Titan - Siebel.mdb	45ce974a573 a14baef06a3b 6eb11e92e	TEXT REMOVED - NOT RELEVANT TO MOTION	support	NCSERV2\Program Files\TomorrowNow\SBL\Titan - Siebel.mdb

Table G: Titan Databases with Corresponding Default Credentials

193.   The credentials in many of these databases are associated with known improper downloading. The "bbohannon" credential, identified in five Microsoft Access databases found on three different SAP TN download servers, was used to develop and test Titan.[77] The StarHub Pte. Ltd. credential was used to improperly download materials for another customer, Global Santa Fe, as shown in Figure 14, below.[78] Nine of the 10 databases containing default passwords were found in Recycle Bin directories, meaning that they were deleted. This supports the fact that the general practice for SAP TN employees was to delete the databases after their use. Much of the information to demonstrate the frequency of improper downloading was destroyed by SAP TN's normal practice of deleting the databases.[79]

194.   It is my opinion that SAP TN's use of hard-coded credentials reveals that SAP TN frequently accessed and downloaded from Customer Connection without regard to using the appropriate credentials. The use of the StarHub credential is just one example where default credentials were used inappropriately to download items for another customer, and Table 9 shows there are at least 160 different occasions where the credentials used to download a file did not match the customer specific folder the file resided in. It is my experience that default software settings exist to make the execution of software simpler. SAP TN's implementation of default credentials required Titan users to initiate action and specify overriding values if they intended to use proper credentials. Therefore, consistent with Ritchie's testimony, Titan was programmed for ease of use first and foremost, while proper authorization was not as important.[80]

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[77] Deposition of John Ritchie, December 2, 2009, at 67:7-9.

[78] *See also* Table 19, below.

[79] As SAP TN provided only logical image files, Mandiant is unable to determine the dates that the databases in Table F were marked for deletion.

[80] *See*, *e.g.*, Deposition of John Ritchie, December 2, 2009, at 48:11-23.

4. SAP TN's Use of Pretextual Customer Information

195. When logging into Oracle Websites, SAP TN often supplied user information (such as user name, email address, and phone number) that did not match the credentials used. Examples of user names provided by SAP TN that Mandiant pulled from Oracle's log files include: "xx," "ss," "User," and "NULL."

196. Similarly, Oracle's logs revealed that SAP TN provided email addresses like "test@testyomama.com" and phone numbers such as "7777777777," and "123 456 7897." In some cases, SAP TN blended login information from multiple customers with false identifying information. For example, one SAP TN downloader logged into Customer Connection using:

- The log-in ID for Yazaki North America, Inc.
- The name "Jeff Livermore," who was listed in SAS as a customer contact for another customer, CC Industries
- An email address used previously for another customer, SPX, rosbie@spxmks.com
- The phone number "4444444444"

197. See eAppendix – "ORCLX-MAN-000140" for complete information about SAP TN pretext information.

D. SAP TN Downloaded Materials Without the Appropriate License

1. SAP TN Downloaded Files into Master Pools

198. SAP TN's downloads were originally stored in two "pools" or master libraries, one for all PeopleSoft customers and one for all JD Edwards customers. These pools of downloads were not linked or otherwise attributable to the customer whose credentials was used to take them.[81]

199. One SAP TN witness referred to the JD Edwards pool as a "massive folder that was not sorted" and that "contained commingled downloads that had been obtained for various customers over time."[82] Mandiant did not find these libraries during our in-depth review of the Data Warehouse, but we were able to locate undifferentiated download folders on SAP TN's systems containing over 2,540 JD Edwards support materials related to JD Edwards EnterpriseOne XE software. See ORCLX-MAN-000149.

2. SAP TN Copied Downloads from the Master Pools into Customer-Labeled Folders

200. SAP TN changed its procedures to store some of its downloads in customer-labeled folders on its systems. However, when SAP TN populated these customer-labeled

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[81] *See, e.g.,* Deposition of Pete Surette, June 19, 2009 at 99:24-104:17; Deposition Exhibit 1456; Deposition of Mark Kreutz, October 29, 2007 at 25:19-27:13; Deposition of Shelley Nelson, December 6, 2007 at 96:5-102:22; Defendants' Responses to Plaintiffs' Second Set of Requests for Admission, Nos. 155, 156 ("Defendant TomorrowNow ADMITS that prior to 2005, for customers receiving extended support from TomorrowNow, certain downloaded items were not separated into discrete folders corresponding to the extended support customers on whose behalf they were downloaded.").

[82] Deposition of Pete Surette, June 19, 2009 at 119:12-127:20.

download folders, it used methods that involved using one customer's downloads to support a different customer.

201.   To accomplish this sorting and copying, SAP TN distributed the multiple copies of each download according to one criterion – SAP TN's assessment of the date the download was created.[83] If, according to SAP TN's records, the customer's maintenance end date with Oracle was after the download's creation date, then SAP TN put a copy of the download in that customer's folder.[84]

202.   SAP TN employees testified that after switching to customer-labeled downloading for new customers, SAP TN continued to access the PeopleSoft download pool to support existing customers, at least until the time of the litigation.[85]

203.   For the JD Edwards download pool, SAP TN divided it by copying the downloads into customer-labeled folders.[86] As the SAP TN employee who designed this process stated, "any given fix could be copied multiple times into multiple customer-specific folders depending on maintenance end date and the date of the file and the folder."[87] SAP TN included during this sorting project the copying of downloads obtained using at least one set of credentials provided by Canada Lands, a company that never became an SAP TN customer.[88]

204.   This process resulted in multiple copies of downloads that had originally been downloaded with one set of credentials being put into another customer's folder.[89]

3.   SAP TN Downloaded JD Edwards Software Without the Appropriate License

a) Unlicensed Downloads in Customer Folders Corroborated with Oracle Log Files

205.   For five SAP TN customers, Merck, Oce, Yazaki, SPX, and Metro Machines, Mandiant was provided licensing information from Oracle. Mandiant compared this information to the downloads in the customer's download folder on SAP TN's systems and corroborated the data with Oracle's log files. See Appendix M.

206.   Mandiant's comparison revealed that, for each of these five customers, SAP TN had downloaded more customer support materials than the customer's license allowed

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[83] *See, e.g.,* Plaintiffs' Deposition Exhibit 1466; Deposition of Pete Surette, June 19, 2009 at 43:25-47:8.

[84] *See, e.g.,* Plaintiffs' Deposition Exhibit 1466; Deposition of Pete Surette, June 19, 2009 at 43:25-47:8.

[85] *See, e.g.,* Deposition of Shelley Nelson, December 6, 2007 at 121:11-125:24.

[86] *See generally* Deposition of Mark Kreutz, February 19, 2008 at 196:15-207:7; Plaintiffs' Deposition Exhibit 67 (noting it would be confusing to call this process "sorting" and not "copying"); Deposition of Pete Surette, June 19, 2009 at 43:25-47:8, 119:12-127:20; Plaintiffs' Deposition Exhibits 1464-67.

[87] Deposition of Pete Surette, June 19, 2009 at 123:22-124:1.

[88] *See, e.g.,* Deposition of Pete Surette, June 19, 2009 at 123:22-124:1; Plaintiffs' Deposition Exhibit 64.

[89] *See, e.g.,* Deposition of Keith Shankle, June 16, 2009 at 84:17-86:14; Deposition of Mark Kreutz, October 29, 2007 at 32:8-52:8; Deposition of Mark Kreutz, February 19, 2008 at 196:15-207:7; Deposition of Pete Surette, June 19, 2009 at 43:25-47:8, 119:12-127:20.

(according to licensing information provided by Oracle - see ORCLX-MAN-000107 through ORCLX-MAN-000116):

Company Folder	Unlicensed Files EnterpriseOne	Unlicensed Files World
Merck	3450	0[90]
OCE Technologies	1570	3076
SPX Cooling	2674	0
SPX Flow	807	0
SPX Weil-McLain	3597	0
Yazaki	10250	1547
Metro Machine	0	4363
Total	22348	8986

Table 15: Unlicensed Downloads in Customer-Labeled Folders

207.   For EnterpriseOne downloads, Mandiant also inspected the Oracle log files for unlicensed downloads. Review of the Oracle log files revealed access to Customer Connection and downloads of SSMs that were outside the scope of the customer's license (according to licensing information provided by Oracle).

Company Performing Download	Unlicensed Files OneWorld
Merck	1,584
OCE Technologies	1,309
SPX	2,877
Yazaki	6,777
Total	12,547

Table 16: Unlicensed Downloads from Customer Connection for OneWorld

208.   Appendix M provides the details of this analysis. Also see ORCLX-MAN-000137.

b) Additional Analysis of JD Edwards World Customer Folders

209.   For SAP TN's JD Edwards World customers, SAP TN noted the system codes on its download request forms that the customer stated it was licensed to download. Those download request forms confirm that SAP TN then instructed its downloading team to download all support materials, not just those related to products the customer had told them it had licensed.[91]

210.   Mandiant reviewed the download request forms and inspected the corresponding customer-labeled folders.   That comparison confirmed that SAP TN downloaded SSMs beyond what the customer told SAP TN that the customer had a license to receive. Mandiant confirmed that over 23,000 downloads were not licensed according to SAP TN's records. *See* ORCLX-MAN-000265 through ORCLX-MAN-000299.

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[90] SAP TN had three "company" folders for SPX: SPX Cooling, SPX Flow, and SPX Weil-McLain.

[91] *See, e.g.*, Deposition of Peggy Lanford, September 22, 2009 at 49:2-51:21; Deposition of Pete Surette, June 19, 2009 at 100:5-115:21; Plaintiffs' Deposition Exhibits 1454, 1456, 1634 (SAP TN marked "all" on the download request forms for the downloads to be performed for each of these customers).

Company Folder on DCITBU01	Unlicensed Files for World Customers
Abbott Labs	167
Ajinomoto Group	153
AmGen	742
Apria Health Care	251
Basler Electric	28
Bonne Bell	47
Canning Vale	138
Caterpillar	748
CC Industries	182
Central Garden	229
COTY	190
Delta Catfish	3,911
DHL	189
Durr	139
Education Direct	178
Flint Group	165
Fuelserv	157
Gruppo Galbani	157
Harley Davidson	191
Helzberg Diamonds	122
Hubbard	267
Laird Plastic	178
Littleton Public Schools	107
Merck	214
Metex	145
Metro Machine	1,298
Murphy Brown	3,657
Rockwood Pigments	1,308
Ronis	409
Schott	149
Seven Seas LTD	322
SPX Flow	171
Texas Associate School Boards	194
Veka	144
VSM Group	180
WWL Vehicle	6,785
Total	**23,612**

Table 17: Identified Unlicensed Downloads for the JD Edwards World Product

c) Additional Analysis of JD Edwards EnterpriseOne Customer Folders

211.   For SAP TN's JD Edwards EnterpriseOne customers, SAP TN did not record the specific system codes to which its customers claimed a license. The download request forms indicate that SAP TN instructed its downloading team to download all SSMs, not just those related to products the customer had told them it had licensed. Mandiant compared the software release level of the customer support materials that the customer told SAP TN that it was licensed to download with the software release level of the files that SAP TN stored on its local systems in that same customer's download folder. This comparison confirmed that SAP TN downloaded Oracle SSMs beyond what the customer told SAP TN that the customer had a license to receive – confirming over 13,000 downloads that were not licensed according to SAP TN's records. *See* ORCLX-MAN-000220 through ORCLX-MAN-000264, ORCLX-MAN-000330, and ORCLX-MAN-000331.

Company Folder on DCITBU01	Unlicensed Files for JD Edwards EnterpriseOne
Abitibi Consolidated	0
ACH Foods	2
ACO Produits	4
Ajinomoto Group	0
Akorn	2,122
AmGen	0
Apria Health Care	0
Bacup Shoe Company	4
BASF	4
Border Foods	2
BT Fuze	0
Canning Vale	0
City of Medicine Hat	0
CSBP Limited	175
Electrolux	2
Foreign Candy Company	4
Hyundai	4
Kellstrom Industries	0
Merck	2,035
MKS	2,555
National Foods Services	4
National Manufacturing	1
Northern Group	4
OCE Technologies	2
On Assignment	2
PCI Limited	1,724
Royal Holiday	2
SPX Cooling	1

Company Folder on DCITBU01	Unlicensed Files for JD Edwards EnterpriseOne
SPX Flow	4
SPX Wiel-McLain	2
Stora Enso Corp	2
TBC Corp	4
Texas Medical Association	4
Transfield Services	5,058
Vanguard Managed Solution	4
Vector Limited	4
Yazaki North America	0
Zimmer	2
Total	**13,737**

Table 18: Identified Unlicensed Downloads for the JD Edwards EnterpriseOne Product

4. Customer Information Captured in Downloads in SAP TN's Customer-Labeled Folders Frequently Does Not Match the Customer

212. When downloading Oracle SSMs, certain areas of Oracle's support websites displayed customer login information to the user in the form of a customer-specific "welcome back" message within the html code. Mandiant used these welcome back messages to trace a small portion of the overall downloads SAP TN performed using inappropriate customer credentials. Mandiant conducted an EnCase search for the expression "Welcome\x20Back\x20" in all html, htm, txt, and jsp files on DCITBU01.[92] The search results were filtered by including the term "representing" in the preview pane of the EnCase search results. Mandiant verified the results by performing a manual review of the search results compared to the file path of each file located in the eight listed DCITBU01 image files. Mandiant thereby identified 97,871 files containing the "Welcome Back" message in customer-labeled folders on DCITBU01.[93] Mandiant analyzed these files to determine the exact credential used to download the file, and then compared them against the customer-labeled folder in which the files were found on DCITBU01.

Image File	Number of Files containing "Welcome Back " in Customer-Labeled Folders
BU01_LOGICAL_21-42	18,909
BU01 LOGICAL IMAGE 43-76	33,779
BU01_LOGICAL_IMAGE_77-105	29,405
BU01 PEOPLESOFT 1-20	14,895
BU01_Robin	5
Canning Vale	1
Englehard	832
Sybase Inc	45
Total	**97,871**

Table G1: Files containing "Welcome Back" in Customer-Labeled Folders on DCITBU01

[92] Please note that "\x20" is a hexadecimal representation for "space" in the ASCII character set.
[93] *See* ORCLX-MAN-000384.

213.   According to Mandiant's analysis of the Data Warehouse, 26,609 files were identified as downloaded from Oracle's support websites into customer-labeled folders with credentials associated with a customer other than the customer-labeled folder used to store the Oracle materials. In total, seventy-one customer-labeled folders contained downloads using the wrong credential (see ORCLX-MAN-100).

214.   The figure below illustrates the folder structure used by SAP TN to store downloaded material from Customer Connection:
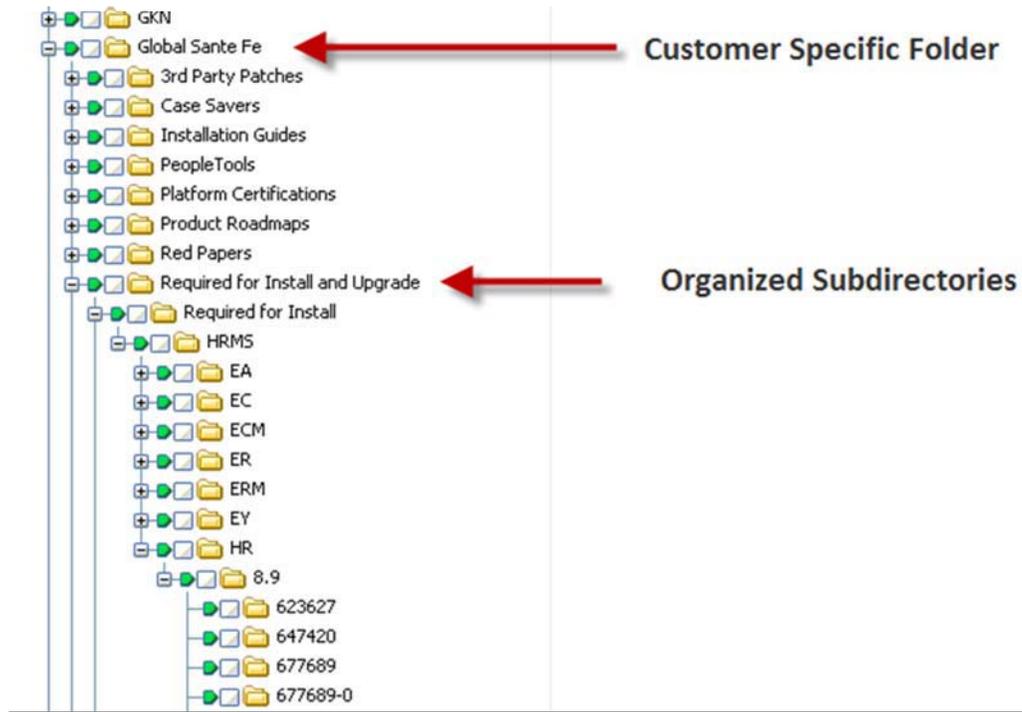
Figure 13: The Folder Structure of SAP TN Downloads of SSMs on DCITBU01

The figure below shows an example of one of the html files found inside of Global Santa Fe's folder:
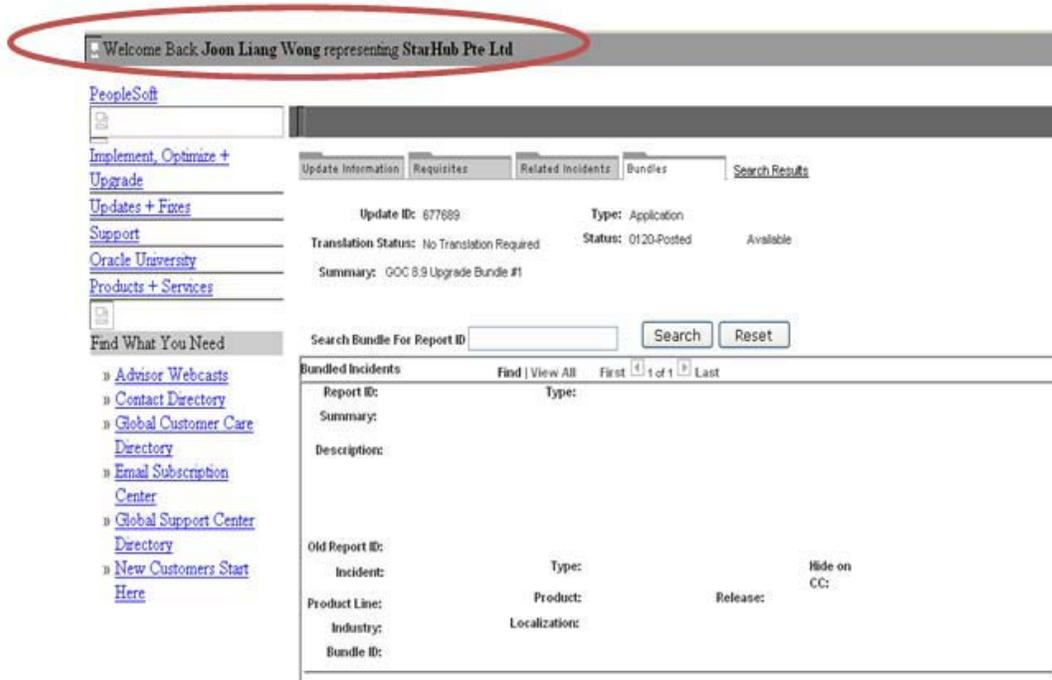
Figure 14: An "html" File Within Global Santa Fe's Folder that Was Downloaded Using StarHub Pte Ltd's Credentials

215.   In summary, 97,871 files could be attributed to a company name, and of those files, 27% were downloaded for other customers than the customers in whose folders they appeared.[94]   The following table provides a summary of HTML files that could be identified with a customer-specific credential in the inappropriate customer folder:

Customer Credential Used	Number of Other Customers With Files From This Customer	Size of Files Downloaded	Number of Files Downloaded
Bear, Stearns	3	468.13 MB	15,352
Trenwick Group	4	70.01 MB	1,120
Vanderbilt University	2	24.85 MB	6,211
Baxter International	6	20.06 MB	743
JB Hunt Transport	2	19.70 MB	538
Wendy's International	13	7.57 MB	294
Parkview Health System	8	6.62 MB	246
Kent County	16	6.00 MB	232
AO Smith Corporation	2	5.36 MB	153
Richmond Power & Light	2	5.35 MB	140
Cerebos Pacific Limited	1	5.28 MB	160
Hitachi Global	1	4.78 MB	127

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[94] *See* ORCLX-MAN-000384.

Customer Credential Used	Number of Other Customers With Files From This Customer	Size of Files Downloaded	Number of Files Downloaded
Ariba, Inc.	1	3.22 MB	48
StarHub Pte Ltd	1	3.06 MB	80
Wellbridge Club Management	2	2.88 MB	105
Allianz Global	3	2.69 MB	100
Interpublic Global Information	1	2.18 MB	52
Alterra Healthcare	1	2.14 MB	484
Wakefern Food Corporation	1	1.99 MB	64
Energy Northwest	1	1.67 MB	46
High Industries	13	983.79 KB	39
American Council on Education	7	939.57 KB	35
American Family Life Assurance	2	933.31 KB	20
Simon Property Group	44	899.04 KB	44
Engelhard Corporation	1	644.20 KB	24
Federated Investors	2	614.11 KB	22
CSK Auto Incorporated	1	345.02 KB	8
Ross Dress for Less	2	325.07 KB	8
Markel Corporation	1	264.72 KB	8
GKN Driveline	1	189.75 KB	6
University of Massachusetts	1	152.17 KB	73
Epiphanygen Inc	1	136.74 KB	5
Newport Corporation	1	134.23 KB	2
Mieco Incorporated	2	82.63 KB	4
Diamond Cluster International	3	60.70 KB	3
Pepsi Cola	1	38.25 KB	1
DataDirect Technologies Corp	1	29.97 KB	1
Toshiba American	1	23.49 KB	1
American Media Inc	1	20.41 KB	1
Tropical Shipping USA	1	17.14 KB	4
Robert Half International	1	14.54 KB	4
Norstan Incorporated	1	4.60 KB	1
Total:	160	670.22 MB	26,609

Table 19: Number of Downloads Using Inappropriate Customer Credentials

5. SAP TN Downloaded and Copied SSMs for Non-Customers

216. SAP TN downloaded SSMs from Oracle's support websites on behalf of potential customers that never signed a contract with SAP TN. It also kept materials it had downloaded even after the customers that had provided the credentials terminated their SAP TN contracts. SAP TN downloaded materials for potential customers Apria Health

Care, Delta Catfish, Fuelserv, Lonestar, Park Stuff, TBC, Thomson Financials, Energy Northwest, Canada Lands Company, Swatch Limited, and Banta Global Turnkey.[95] Mandiant's analysis of the Oracle logs revealed the use of credentials for Fuelserv, Banta, and TBC. Even though some customers did not ever sign an SAP TN contract, SAP TN kept the downloads taken for those potential customers for its commercial use in general and with customers that did sign contracts. For example, with respect to Canada Lands, an SAP TN employee stated, "we kept the folder around since the beginning, the downloads were very incomplete and we would look for fixes here for customers like Praxair and Yazaki."[96] SAP TN also copied the Canada Lands downloads into other customers' folders during the project to create customer specific folders from the JD Edwards master pool of downloads, described above.[97]

6. SAP TN "Exploded" Downloads to Create an Index It Could Use Across Its Customer Base

217. SAP TN used downloads from Oracle's support websites to develop SAP TN's search engine, known as "Information Station." Information Station provided a quicker way to search across SAP TN's download libraries.[98]

218. Information Station included a tool that manipulated the filenames assigned to the Oracle downloaded materials, so that SAP TN could index them in a way that allowed its search engine to work. To create this index, SAP TN copied "customer-specific" downloads into a central location on its AS/400 server, and "exploded" or unzipped the files to manipulate them in a way that worked with Information Station.[99] SAP TN used Information Station's searching capabilities to cross-search multiple customers' download libraries if a solution could not be found in the library for the customer who needed it.[100] SAP TN also maintained a non-customer specific pool of downloaded JD Edwards documentation in a "generic folder" that was "available for use with all customers" and that SAP TN indexed with Information Station.[101] SAP TN maintained these "exploded" files on the AS/400 for research purposes without distinguishing which customer's credentials had been used for the downloads.[102]

E. THE DOWNLOADED SSMS ARE COVERED BY ORACLE'S REGISTERED COPYRIGHTS ASSERTED IN THIS ACTION

1. Comparison of Downloads to Automated Databases

219. The first level of analysis that Mandiant performed was to compare the downloads on SAP TN's computer systems to the SSM content provided by Oracle and represented to be included within Oracle's registered automated databases.[103] Mandiant determined approximately 200,000 identical file matches by MD5 Hash on SAP TN's computer

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[95] *See, e.g.,* SAP TN's Responses to Oracle Corp.'s Third Set of Interrogatories, No. 10.

[96] Plaintiffs' Exhibit 65; *see also* Deposition of Pete Surette, June 19, 2009 at 127:3-20.

[97] *See, e.g.,* Deposition of Pete Surette, June 19, 2009 at 119:12-127:20.

[98] *See, e.g.,* Deposition of Mark Kreutz, October 29, 2007, 13:25-16:6; 18:2-19:17; 21:13-23:2.

[99] *See, e.g.,* Deposition of Mark Kreutz, February 19, 2008, 219:7-228:3.

[100] *See, e.g.,* Deposition of Mark Kreutz, February 19, 2008, 236:7-243:5.

[101] *See, e.g.,* Deposition of Mark Kreutz, February 19, 2008, 228:4-232:23.

[102] *See, e.g.,* Deposition of Mark Kreutz, October 30, 2007, 140:6-148:24.

[103] *See, e.g.,* Plaintiffs' Sixth Supplemental Responses and Objections to Defendant TomorrowNow, Inc.'s Interrogatory No. 13; ORCL206 (Siebel Automated Database), ORCL266 (PeopleSoft and JD Edwards Automated Databases).

systems based upon analysis in Appendices C & F. Furthermore, Mandiant identified approximately 2,000 files matching by content but not by MD5 Hash based upon analysis in Appendix F. The comparison supports my opinion that many of the knowledge management and documentary content downloaded by SAP TN to its computer systems from the Oracle support websites is contained within the content of Oracle's automated database copyright registrations (see ORCLX-MAN-00045, ORCLX-MAN-00046, ORCLX-MAN-000047, and ORCLX-MAN-000142).

220. The following table identifies the number of files acquired by SAP TN that identically matched files on the automated database per product line:

Oracle Product Line	Number of Files
PeopleSoft	18,849
JD EDWARDS	168,331
Siebel	28,564
Total	**215,744**

Table 20: Downloads Identified on SAP TN Systems Matching the Automated Databases

2. Comparison of Custodial Productions to Automated Databases

221. After the initial report's submission on November 16, 2009, Mandiant received two separate DVD discs identified as "Siebel Downloads on Custodian Machines." These discs were labeled "MUV_PHI" and "CEF_JAH", and contained the following custodian names: Phillips, A., Muvvala, C., Cefola, A., and Jahrsdoefer, M. These two DVDs contained 310,702 text files. The metadata that describes the contents of these discs can be found at ORCLX-MAN-000355.[104] Mandiant understands that these discs contained materials from custodial productions for the identified custodians.

222. Mandiant's review determined that approximately 310,700 of these files were Siebel SSMs downloaded from Oracle's Web site, that 4,089 files were exact file name matches to files contained within the Siebel Automated Database, that an additional 6,010 files matched by file name after Mandiant made certain discrete changes to the file names, and that for each of the 10,099 files that matched either exactly or approximately by filename, a substantial portion of the content was contained within Oracle's automated database for Siebel SSMs. See Appendix F, Section 4, for details.

3. Comparison of SAP TN Downloads to Registered PeopleSoft Code

223. SAP TN's downloading also included many SSMs for PeopleSoft Enterprise Application Software. Certain of these PeopleSoft SSMs are based in part on the current software release code, but are also built into the software code for later software releases. Mandiant compared certain of the SAP TN downloads on DCITBU01 to the PeopleSoft software code that Oracle provided as embodying Registered Works and found that 74% of the analyzed File-based Objects on DCITBU01 contained more than 90% of a File-based Object found in that PeopleSoft software code.[105]

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[104] See also ORCLX-MAN-000362.

[105] *See* Appendix E.

4. Comparison of Individually-Registered Downloads to SAP TN Download Servers

224. Mandiant compared individual SSM files that Oracle identified as Registered Works to downloads on the SAP TN download servers.[106] The Oracle registered individual SSMs that Mandiant used for this comparison are identified below by registration number, description, and bates-number (see Appendix N):

Registration #	File Description	Bates Number
TX0006541046	ESU for JD Edwards EnterpriseOne 8.0 (file JE1398)	ORCL00264056
TX0006541037	ESU for JD Edwards EnterpriseOne 8.10 (file PG4998)	ORCL00264056
TX0006541035	ESU for JD Edwards EnterpriseOne 8.11 (file PH11676)	ORCL00424307
TX0006541027	ESU for JD Edwards EnterpriseOne 8.11 SP1 (file JJ13072)	ORCL00264056
TX0006541045	ESU for JD Edwards EnterpriseOne 8.12 (file JK10093)	ORCL00264056
TX0006541036	ESU for JD Edwards EnterpriseOne 8.9 (file PF4811)	ORCL00264056
TX0006541051	ESU for JD Edwards EnterpriseOne Xe (file JD20309)	ORCL00264056
TX0006541043	Code Change for JD Edwards World A7.3 (file A738217431)	ORCL00264056
TX0006541044	Code Change for JD Edwards World A8.1 (file A818217458)	ORCL00264056
TX0006541019	PeopleTools Third Party Daylight Saving Time Required Modifications	ORCL00009382
TX0006541020	ECRM89: Common Errors on Mobile Sales	ORCL00009359
TX0006541021	GM--Grants issues resolved by FMS ESA 8.9 Bundle #10-653723 (Oct 06)	ORCL00009379
TX0006541022	E1: 07/77: Quantum for Payroll Tax v.280	ORCL00009375
TX0006541023	EAP WTHD06: 1099 IRS changes for the year 2006	ORCL00009363
TX0006541024	E1: 1099: Year 2006 1099 ESUs	ORCL00009369
TX0006541025	Changes to Daylight Savings Time for 2007 (DST)	ORCL00009372; ORCL00466978-81
TX0006541026	JD Edwards World -- 1099 Changes for Tax Year 2006	ORCL00009366; ORCL00466978-81

Table 21: Registered SSMs from Oracle's Complaint ¶ 158

225. Mandiant found over 100 copies of the individual ESUs and code changes described in the table above as registration numbers TX0006541027, TX0006541035-37, TX0006541043-46, and TX0006541051 on SAP TN's download servers. *See* Appendix N for complete results. Certain of these registered SSMs also show up in the portion of the Yazaki, Merck, and SPX customer folders that Oracle records determined were unlicensed, discussed above. For example, Mandiant identified file JE1398 as one of the unlicensed downloads in the Yazaki folder, file PG4998 as one of the unlicensed downloads in the Yazaki and Merck folders, file PH11676 as one of the unlicensed downloads in the Yazaki and SPX folders, file JJ13072 as one of the unlicensed downloads in the Yazaki and SPX folders, and file JK10093 as one of the unlicensed downloads in the Yazaki and Merck folders (see ORCLX-MAN-000118). Finally, one ESU, JD20309, was located in a generic JD Edwards download folder on the SAP TN server JDWSVR01_G along with 2539 other ESUs for the EnterpriseOne XE software. *See* Appendix N for complete results.

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[106] Based on my discussion with Oracle's Chief Corporate Architect, Edward Screven, I understand that JD Edwards ESUs, Fixes, and other SSMs are based upon and become incorporated into later versions of JD Edwards-branded Oracle Enterprise Application Software.

226. Similarly, Mandiant located the solution and DST downloads, described in the table above as registration numbers TX00006541019-26, in the SAP TN customer-labeled folders. More specifically, Mandiant found copies of the solutions described above as TX00006541020-26 in the Baker Botts customer folder. Similarly, Mandiant found three copies of the Daylight Savings Time solutions, described above as TX00006541019, on the two of SAP TN's servers, TN-FS 01 and DCPSTEMP 01.

VII. CONCLUSION 2: SAP TN MADE THOUSANDS OF FULL OR PARTIAL COPIES OF ORACLE ENTERPRISE APPLICATION SOFTWARE AND DATABASE SOFTWARE

227.   SAP TN made and maintained copies of Oracle Enterprise Application Software and Oracle Database software in the form of:

- CD Binders collected from Oracle clients
- CD Jukebox
- PeopleSoft Environments
- JD Edwards World Environments
- JD Edwards EnterpriseOne Environments
- Siebel Environments
- Oracle Databases

A.   SAP TN's CD Binders Contained Over 750 Copies of Oracle Software

228.   During its on-boarding process, SAP TN requested a copy of the Oracle Enterprise Application Software that the customer had asked SAP TN to support. Typically, SAP TN copied these CDs/DVDs of Oracle Enterprise Application Software, and maintained these copies in a binder with a label corresponding to the software type and release level.[107]

229.   SAP TN's CD binders contain thousands of CDs, photocopies of CDs, and other related documents. I understand that the Parties have jointly estimated they contain roughly 15,000 to 18,000 physical CDs and/or DVDs, and that the exact count will soon be confirmed. These CD Binders and the CDs/DVDs within are labeled with the software contents, which an SAP TN witness testified he tried to make accurately.[108] Exhibits with illustrative screenshots of directory listings and setup.ini files from actual CDs in the CD Binders are included as eAppendix - "ORCLX-MAN-000211." Oracle and Defendants jointly engaged Merrill Legal Solutions to index these CD Binders and CDs/DVDs to identify what is contained on each CD/DVD.

230.   Mandiant reviewed Merrill Legal Solution's index of the contents of the CD Binders (completed on November 24, 2009) to identify what is contained on each CD/DVD. In conjunction with Mandiant's physical review of the CDs and the testimony by Defendants' employees about their CD-copying procedures, Mandiant determined the CD Binders contained approximately 14,717 physical CDs/DVDs identified within the CD Binders. These 14,717 physical disks included 778 copies of Oracle Enterprise Application Software, PeopleTools, and Oracle Database Software.[109]

231.   Mandiant identified 757 copies of Install Media for Oracle Enterprise Application Software and Oracle Database within SAP TN's CD Binders. If, as I assume, every copy of Install Media for Oracle Enterprise Application Software or Oracle Database Software is a copy of the associated Oracle Enterprise Application Software or Oracle Database Software

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[107] *See, e.g.*, Deposition of Peggy Lanford, September 22, 2009 at 60:9-63:3; Deposition of Desmond Harris, October 9, 2009 at 24:5-28:10; Deposition of John Baugh, February 6, 2008 at 84:3-87:10.

[108] *See, e.g.*, Deposition of Desmond Harris, October 9, 2009 at 48:23-49:9, 71:1-73:23; Plaintiffs' Deposition Exhibits 1665, 1666, 1667.

[109] See Appendix B, Section 7, for details.

(and of the Protectable Expression contained in the Oracle Enterprise Application Software or Oracle Database Software), all 757 are copies of software that contain substantial amounts of protectable expression from Oracle's Registered Works.

232.   Mandiant identified 21 CDs of PeopleSoft HRMS Tax Updates. Based on the assumption that all updates to PeopleSoft HRMS embody a portion of one of Oracle's Registered Works, all 21 are copies of a portion of one of Oracle's Registered Works.

233.   According to Merrill Legal Solution's index, 30 of the 757 Install Media copies were original Oracle Install Media.[110] Therefore, SAP TN created approximately 727 copies of Install Media and all 21 of the PeopleSoft HRMS Tax Updates CDs found in the CD Binders.

B.   THE PEOPLESOFT CD JUKEBOX

234.   SAP TN's general practice was to copy the Oracle Install Media received from customers to designated areas on SAP TN's network called the Client CD Jukebox.[111] Mandiant identified Client CD Jukebox materials in two locations on SAP TN's systems, on servers named TNFS_01 and TEMPSTORE. The table below indicates the number of files located in each Client CD Jukebox.

SAP TN System	Number of Files	Size in GB
TNFSO1	586,720	368.2
TEMPSTORE	101,245	47.4
TOTALS	**687,965**	**415.6 GB**

Table 22: Storage of Oracle Install Media Located on SAP TN Systems

235.   The figure below illustrates a sample of Oracle Enterprise Application Software received by SAP TN, and ultimately copied onto an SAP TN server named TEMPSTORE.

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[110] See ORCLX-MAN-000349"Original_Oracle_Install_Media.xls."

[111] *See, e.g.*, Deposition of John Baugh, February 6, 2008 at 84:3-87:23; Deposition of Jeff Buehrle, November 20, 2009 at 60:16-66:17.
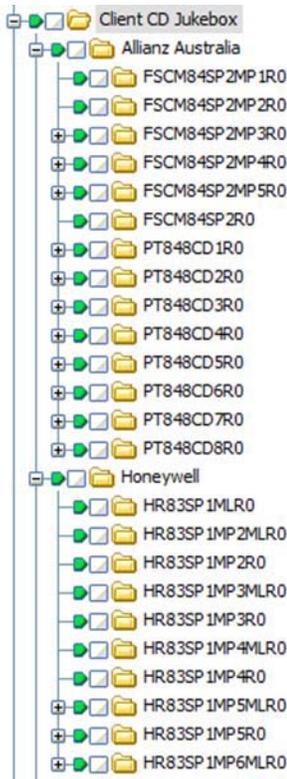
Table 23: Client CD Jukebox Identified on SAP TN Server TEMPSTORE

236.   By collecting and copying the original Oracle Install Media from each customer, SAP TN was able to build a library of many versions of software released for the PeopleSoft and JD Edwards product lines.   A spreadsheet listing the Oracle Enterprise Application Software located in the Client CD Jukebox is attached as eAppendix – "ORCLX-MAN-000134." SAP TN then used this software to build the Environments it needed.

237.   SAP TN disclosed that 6 additional copies of Oracle Database Install Media were downloaded to \TN Software Library\Oracle on TN-FS01_F.[112] The following table lists the six additional copies of Oracle Database Install Media:

Oracle Database Installation Software	SAP TN Server	SAP TN Full Path
Oracle 10g release 2 for AIX	TN-FS01	TN-FS01_F Slice5\TN Software Library\Oracle\AIX\Oracle 10g release 2;
Oracle 8i release 3 (8.1.7) Enterprise Edition for AIX	TN-FS01	TN-FS01_F Slice5\TN Software Library\Oracle\AIX\Oracle 8i release 3 (8.1.7) Enterprise Edition
Oracle 8i release 3 (8.1.7) Enterprise Edition (64-bit) for AIX	TN-FS01	TN-FS01_F Slice5\TN Software Library\Oracle\AIX\Oracle 8i release 3 (8.1.7) Enterprise Edition (64-bit)
Oracle8i Enterprise Edition Release (8.1.7) for Compaq	TN-FS01	TN-FS01_F Slice5\TN Software Library\Oracle\Tru64 Unix\Oracle8i Enterprise Edition Release (8.1.7) for

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[112] *See* Defendants' Responses and Objections to Plaintiffs' Fifth Set of Interrogatories to Defendant Tomorrow Now, Inc., and Fourth Set of Interrogatories to Defendants SAP America, Inc. and SAP AG, Responses to Interrogatories 122 and 124.

Oracle Database Installation Software	SAP TN Server	SAP TN Full Path
Tru64 UNIX		Compaq Tru64 UNIX
Oracle 10g release 2 for Windows 2000 or NT	TN-FS01	TN-FS01_F Slice5\TN Software Library\Oracle\Windows2000 or NT\Oracle 10g release 2;
Oracle8i release 3 for Windows 2000 or NT	TN-FS01	TN-FS01_F Slice5\TN Software Library\Oracle\Windows2000 or NT\Oracle8i release 3;

Table H: Additional copies of Oracle Database Install Media

238. If, as I assume, every copy of Install Media for Oracle Enterprise Application Software or Oracle Database Software is a copy of the associated Oracle Enterprise Application Software or Oracle Database Software (and of the Protectable Expression contained in the Oracle Enterprise Application Software or Oracle Database Software), all 6 copies contain substantial amounts of protectable expression from Oracle's Registered Works.

C. CUSTOMER ENVIRONMENTS

239. SAP TN created and stored thousands of copies of Oracle Enterprise Application Software as Local Environments residing on servers in SAP TN's infrastructure. SAP TN installed these Environments from Oracle Install Media or copies of Environments obtained from its customers. [113] SAP TN copied and used these Environments for many different purposes, including[114]:

- Replicating issues reported by customers (sometimes for the customer that provided the software and sometimes for other customers)
- Reference and research (sometimes for specific customer issues and sometimes for individual employee knowledge gathering)
- Developing Fixes (for individual or multiple customers)
- Testing Fixes (for individual or multiple customers)
- Bundling Fixes into tax and regulatory Updates (for individual or multiple customers)
- Testing Bundles
- Creating backup and restore copies in the development and testing processes (and for other purposes)
- Comparing code across Environments for quality assurance
- Sending copies of Environments to customers for remote support operations
- Training employees

240. Mandiant identified numerous active and backup Environments created with Oracle Enterprise Application Software residing within SAP TN's infrastructure. This includes active and backup Environments identified in Encase images produced on or after November 1, 2009. See Appendices H and I.

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[113] *See, e.g.*, Deposition of Jeff Buehrle, November 20, 2009 at 37:19-39:6; *id.* at 60:16-78:10; SAP TN's Responses to Plaintiffs' Fourth Set of Interrogatories, No. 82 (updated on November 16, 2009).

[114] *See, e.g.*, Deposition of Wanda Jones, November 18, 2009 at 15:17-17:23; SAP TN's Responses to Oracle Corp.'s First Set of Interrogatories, No. 3 (updated on December 4, 2009); SAP TN's Responses to Oracle USA's First Set of Interrogatories, No. 9 (updated on December 4, 2009); SAP TN's Responses to Plaintiffs' Fourth Set of Interrogatories, No. 82 (updated on November 16, 2009); Defendants' Responses to Plaintiffs' Fifth Set of Requests for Admission, Nos. 177-79; 201-02.

D. ACTIVE PEOPLESOFT ENVIRONMENTS

241. A PeopleSoft Environment is created by installing the PeopleSoft applications and PeopleTools utility, and populating a database with code originating from the PeopleSoft application.

242. The combined installation of the PeopleSoft base application and PeopleTools utility create a directory, commonly referred to as a PS_HOME. Source and application code from the Install Media is stored on the target file system within the PS_HOME directory.

243. In addition to PeopleTools and the PeopleSoft application, the software needs a database product to function as an Environment. The PeopleSoft applications contained within a PS_HOME directory are used to connect to a database and populate it with structures and PeopleCode. The database can be vendor-agnostic such as Oracle, SQL Server, Sybase, or DB2, but once it is associated with a PS_HOME directory, the database contains Oracle code.

244. In summary, both the PS_HOME and database contain Oracle code. Mandiant identified each existence of a PS_HOME directory or PeopleSoft Database on SAP TN's infrastructure using the following methodology:

1. Methodology

Mandiant used the following protocol to identify Environments (including a PS_HOME directory and/or PeopleSoft Database located on SAP TN's infrastructure:

Step 1: Mandiant reviewed SAS, BakTrak, and Pathfinder to note the following:

- Environment names
- Application server names
- Database server names
- Relevant paths of each installation

Step 2: Mandiant reviewed the server images produced in the Data Warehouse that matched the server names indicated in Step 1 (SAS, BakTrak, and Pathfinder).

Step 3: Mandiant used EnCase to select either the PS_HOME directories or PeopleSoft Databases identified in the Data Warehouse based on the following criteria:

- Similar naming convention of identified Environments
- Similar path locations of identified Environments

Step 4: Mandiant captured the metadata associated with each occurrence of a PS_HOME or PeopleSoft Database by recording the following:

- Full path
- Image file
- Last written date

Step 5: Mandiant identified each Environment as either a PS_HOME or PeopleSoft Database based on the following criteria:

- PS_HOME
  - Contained files related to a default installation of PeopleTools and a PeopleSoft base application
- PeopleSoft Database
  - Contained files related to a database application
  - Mandiant did not record database files that contained "admin" within the storage path of the files since no Oracle Enterprise Application Software is normally contained within that folder.

2. Findings

245. Mandiant identified a total of 357 PS_HOME directories and 106 PeopleSoft Databases containing code from PeopleSoft Enterprise Software applications on SAP TN's systems. The 357 PS_HOME directories and 106 PeopleSoft Databases combined to reference 262 unique Environment names. The discrepancy between an Environment instance and a unique Environment name was caused by both the PS_HOME and PeopleSoft Database identified by the same Environment name. However, the PS_HOME and PeopleSoft Database were stored in different locations on SAP TN's infrastructure.[115]

246. In the RSM, Environments were typically named according to product, release, and code level, without reference to any customer. For instance, the HR75104B Environment is explained by the following criteria:

- HR – Human Resources Management Systems (HRMS)
- 751 – Release version of HRMS
- 04B – Environment updated to include 2004-B tax and regulatory Updates (as either published by Oracle or as retrofitted by SAP TN)[116]

247. During the actual retrofit process, SAP TN would create copies of these retrofit Environments for replication, development, and testing (*e.g.*, HR751REP, HR751DEV, HR751TST), as explained in a previous section above.[117]

248. After a certain point in time, SAP TN generally began using a "customer-labeled" naming convention to identify Environments. For instance, the H881NCLO Environment name is explained by the following criteria:

- H – Human Resources Management Systems (HRMS)
- 881 – Release version of HRMS
- NCL – SAP TN customer prefix (NCL represents Norwegian Cruise Lines)
- – Database platform associated with the Environment (O represents Oracle)[118]

249. The customer prefix in the Environment name does not guarantee that the Environment was created using that customer's Oracle Enterprise Application Software. For example, H702RHIM (RHI = Robert Half International) was created using software obtained from

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[115] *See also* SAP TN's Responses to Oracle USA's First Set of Interrogatories, No. 9 (listing servers containing components of PeopleSoft and JD Edwards software applications).

[116] *See, e.g.,* SAP TN's Responses to Plaintiffs' Fourth Set of Interrogatories, No. 82, and cited testimony.

[117] *See, e.g.,* SAP TN's Responses to Plaintiffs' Fourth Set of Interrogatories, No. 82, and cited testimony; Deposition of Catherine Hyde, April 2, 2008 at 114:13-127:25.

[118] *See, e.g.,* SAP TN's Responses to Plaintiffs' Fourth Set of Interrogatories, No. 82, and cited testimony.

either Safeway or Washington Gas Light.[119]   Nor does the customer prefix indicate that the Environment was used to support that customer only. As explained in Section VI, SAP TN regularly used "customer-labeled" Environments to develop Fixes or otherwise support multiple customers.

250.   Many SAP TN Environments did not follow either naming convention. For instance, SAP TN had a series of Local Environments designated as "DATM" Environments for manipulating data Fixes for multiple customers per release.   These DATM Generic Environment names did not reference a customer (*e.g.,* D831DATM).[120] SAP TN also had several "CSS" Generic Environments which it used to support multiple customers (*e.g.*, HR751CSS).[121]   These are only examples of non-conforming Environment names. SAP TN had many others, some of which its witnesses have been able to explain in deposition and some they have not (*e.g.,* F753AU, H751FXC, HR751SKP, etc.).[122]   SAP TN also had many Environments for which, "after an extensive review of the available data, SAP TN has not currently been able to determine the specific source of the media used to build some of the environment components." [123]   Mandiant reviewed TN-OR08720040 and determined that SAP TN was unable to identify the specific source for approximately 29.60% of its local environments (95 out of 321).   Mandiant also noted that of the approximately 123 Generic Environments used locally, SAP TN was unable to find a specific source used to build the Environments for 84 (68.29%).   See ORCLX-MAN-000352.

251.   The H881NCLO Environment was identified on SAP TN server PSDEV01.   The following figures illustrate the H881NCLO Environment's PS_HOME directory and corresponding database identified on PSDEV01:

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[119] *See, e.g.*, Deposition of Catherine Hyde, May 12, 2009 at 45:18-25.

[120] *See, e.g.,* Deposition of Catherine Hyde, April 2, 2008 at 72:13-90:7.

[121] *See, e.g.,* Deposition of John Baugh, February 6, 2008 at 43:17-50:24.

[122] *See, e.g.,* Deposition of Catherine Hyde, April 2, 2008 at 90:8-114:12, 128:1-157:18.

[123] SAP TN's Responses to Plaintiffs' Fourth Set of Interrogatories, No. 82, and cited testimony (updated on November 16, 2009). Mandiant reserves the right to amend or supplement its conclusions, report, or both, if Defendants later provide any information contradicting that statement.
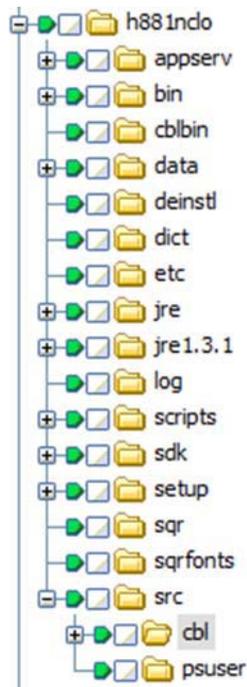
Figure 15: PS_HOME Directory of H881NCLO
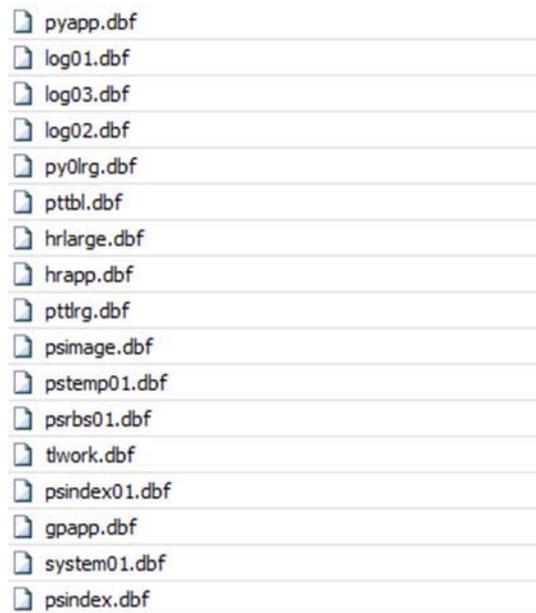
Figure 16: Database Files of Environment H881NCLO

The 262 Environments were determined by locating 357 PS_HOME directories and 106 corresponding PeopleSoft Databases. The Environments were identified on the following servers:

SAP TN Servers containing PS_HOMEs and Databases	Count of PS_HOMEs and PeopleSoft Databases
PSDEV01	215
DCPSTEMP01	70
DCPSTEMP02	79
HOMER	17
YOGI	82
Total	**463**

Table 24: Count of PS_HOMEs and PeopleSoft Databases Found Within SAP TN Servers

The following table shows the number of PS_HOME directories and PeopleSoft databases found on SAP TN's infrastructure:

Number of PS_HOME directories and Databases	Total
Database	106
PS_HOME	357
Total	**463**

Table 25: Number of PS_HOME Directories and PeopleSoft Databases

252.   After the initial report submission on November 16, 2009, Mandiant received Encase images of SAP TN servers PSDEV02, DCPSDB01, and PSNT01. Mandiant reviewed these systems and identified an additional 103 PS_HOME directories and active PeopleSoft Databases by following the same methodology outlined in our prior analysis (See ORCLX-MAN-000159). The table below lists the number of active PeopleSoft Databases Mandiant identified on SAP TN servers PSDEV02, DCPSDB01, and PSNT01 (See ORCLX-MAN-000342):

SAP TN Servers Containing Active PeopleSoft PS HOMEs and Databases	Count of PeopleSoft PS HOMEs and Databases
PSDEV02	21
DCPSDB01	66
PSNT01	16
Total	**103**

Table I: Count of Active PeopleSoft PS_HOMEs and Databases found on PSDEV02, DCPSDB01, and PSNT01

253.   With the addition of the 103 PS_HOMEs and PeopleSoft Databases Mandiant found on PSDEV02, DCPSDB01, and PSNT01, Mandiant identified a total of approximately 566 PS_HOMEs and PeopleSoft Databases within the SAP TN infrastructure. Tables J and K, below, combine the results of Report Tables 24 and 25, respectively, with the additional counts from PSDEV02, DCPSDB01, and PSNT01:

SAP TN Servers containing PS HOMEs and/or Databases	Count of PS HOMEs and/or PeopleSoft Databases
PSDEV01	215

SAP TN Servers containing PS HOMEs and/or Databases	Count of PS HOMEs and/or PeopleSoft Databases
DCPSTEMP01	70
DCPSTEMP02	79
HOMER	17
YOGI	82
PSDEV02	21
DCPSDB01	66
PSNT01	16
Total	**566**

Table J: Count of PS_HOMEs and PeopleSoft Databases Found On SAP TN Servers

Number of PS_HOME Directories and Databases found on SAP TN Servers	Total
Database	193
PS_HOME	373
Total	**566**

Table K: Number of PS_HOMEs and PeopleSoft Databases found on SAP TN Servers

254. The 566 identified PS_HOMEs and PeopleSoft Databases considered in Tables J and K, above, are listed in ORCLX-MAN-000360. The 373 PS_HOME directories and 193 PeopleSoft Databases combined reference approximately 267 unique Environment names. All 566 PS_HOMEs and PeopleSoft Databases contain material protected by Oracle Registered Works, as discussed in Section X, below.

E. PEOPLESOFT BACKUP ENVIRONMENTS

255. SAP TN also stored customer Environments as backups. A backup at SAP TN was a copy of all or some portion of an Environment in a compressed format, preserving at a specific point-in-time the data and/or code in the Environment (which itself is a whole or partial, often modified, copy of Oracle Enterprise Application Software).[124] Many backups were recorded in BakTrak (as explained in Section V).[125] The primary purpose of a backup at SAP TN was to preserve the codeline in an Environment at some point in time to have available as a clean version after SAP TN made modifications to the active Environment in support of customers.[126]

1. Methodology

256. Mandiant determined SAP TN's naming convention for backing up PeopleSoft Environments by reviewing internal documentation found on the system known as

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[124] *See, e.g.,* Deposition of Catherine Hyde, April 2, 2008 at 157:19-161:23; Deposition of George Lester, April 23, 2009 at 43:11-48:20.

[125] *See, e.g.,* Deposition of Catherine Hyde, April 2, 2008 at 157:19-161:23; Deposition of George Lester, April 23, 2009 at 43:11-48:20; s*ee also* Defendants' Responses to Plaintiffs' Second Set of Requests for Admission, Nos. 220-222 ("Defendant TomorrowNow ADMITS that often in the "Backup" entries in BakTrak database where a "Y" is indicated for "NT," the contents of the PS_Home file corresponding to the name under the column "ENVIRONMENT" would have been backed-up, which could include the use of some form of compressed or zip file.").

[126] *See, e.g.,* Deposition of Catherine Hyde, April 2, 2008 at 157:19-161:23; Deposition of George Lester, April 23, 2009 at 43:11-48:20.

TNFS01 and based on SAP TN's testimony regarding BakTrak.[127] SAP TN created backups of PeopleSoft Environments by compressing a PS_HOME, PeopleSoft Database, or both, as recorded in BakTrak. SAP TN generally identified backup Environments by the following naming convention:

- EnvironmentName_YYYYMMDD_HHMM.exe/zip/gz/tar (where YYYY=Year, MM = Month, HH=Hour, and MM=Minutes)

257. According to this naming convention, Mandiant identified sixty-one backups of the H881DDMO Environment (41 PS_HOME backups and 20 PeopleSoft Database backups). An example of eight of these sixty-one backups identified for the H881DDMO Environment can be found in the following figure:

Sample Backups of H881DDMO	
File Name	Location at SAP TN
h881ddmo_20060308_0717.zip	DCITBU02 \psbackup\tn-dell2650-01\psoft\backups\h881ddmo_20060308_0717.zip
h881ddmo_20060309_0700.zip	DCITBU02 \psbackup\tn-dell2650-01\psoft\backups\h881ddmo_20060309_0700.zip
h881ddmo_20060320_1141.ZIP	DCITBU02 \psbackup\tn-dell2650-01\psoft\backups\h881ddmo_20060320_1141.ZIP
h881ddmo_20060412_0828.zip	DCITBU02\psbackup\tn-dell2650-01\psoft\backups\h881ddmo_20060412_0828.zip
h881ddmo_20060320_1141.tar.gz	DCITBU02\psbackup\psdev01\d02\backup\oracle\backup\h881ddmo_20060320_1141.tar.gz
h881ddmo_20060309_0700.tar.gz	DCITBU02\psbackup\psdev01\d02\backup\oracle\backup\h881ddmo_20060309_0700.tar.gz
h881ddmo_20060308_0717.tar.gz	DCITBU02\psbackup\psdev01\d02\backup\oracle\backup\h881ddmo_20060308_0717.tar.gz
h881ddmo_20060418_1305.tar.gz	DCITBU02\psbackup\psdev01\d02\backup\oracle\backup\h881ddmo_20060418_1305.tar.gz
h881ddmo_20060412_0828.tar.gz	DCITBU02\psbackup\psdev01\d02\backup\oracle\backup\h881ddmo_20060412_0828.tar.gz

Table 26: Example of 4 PS_HOME Backups and 4 Corresponding PeopleSoft Database Backups

258. To identify all Environment backups of PeopleSoft applications, Mandiant used the following process:

Step 1: Mandiant reviewed the 46 systems produced in the Data Warehouse.

Step 2: Mandiant filtered data based upon on file extensions commonly used for compressed files:

1. ".exe"
2. ".zip"
3. ".gz"
4. ".tar"

Step 3: Mandiant identified files that matched SAP TN's naming convention for backup Environments. Specifically, Mandiant created an expression that looked for "_########_####", where "#" represents an integer between 0-9.

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[127] *See*, *e.g.,* ORCLX-MAN-000132, ORCLX-MAN-000133.

Step 4: Mandiant exported the metadata for all file names matching the Environment backup file naming convention.

Step 5: Mandiant identified each backup Environment as a PS_HOME, PeopleSoft Database, or Unknown by the following criteria:

1. PS_HOME – to be classified as a PS_HOME, the following values would need to be identified in the path:

   - PSHome

   - Psoft

2. PeopleSoft Database – to be classified as a PeopleSoft Database, the following values would need to be identified in the path:

   - DB

   - Oracle

   - Reference to a database software

3. Unknown - to be classified as an Unknown, previous values were not identified in the path

Step 6: Mandiant recorded each backup Environment with extracted metadata by the identification process in Step 5. The data can be found in eAppendix – "ORCLX-MAN-000123".

259. After each backup was identified throughout SAP TN's infrastructure, Mandiant extracted each identified backup from the EnCase images produced in the Data Warehouse to be further analyzed. After extraction, Mandiant decompressed each Environment backup. The total size of all Environment backups after decompression was over 10 terabytes, consisting of over 20,000,000 files.

2. Findings

260. Mandiant's review of the backup PeopleSoft Environment copies on SAP TN's computer systems has established that SAP TN had over 3,000 PeopleSoft backup Environment copies. *See* ORCLX-MAN-000319 for a hash value comparison of the Registered Works to the files in SAP TN's uncompressed backup environments.

261. The following table identifies the number and location of backup Environments containing Oracle code on SAP TN's servers produced in the Data Warehouse (*See* ORCLX-MAN-000123):

Server	Number Of Backups
DCITBU02	2568
DCPSTEMP01	29
DCPSTEMP0202	2
PSDEV01	48
PSDEV03	2
TN-FS01	9
TNWTS01	504

Server	Number Of Backups
TOTAL	3162

Table 27: The Number of Backup Environments

262. After the initial report's submission on November 16, 2009, Mandiant received Encase images of SAP TN servers PSDEV02 and PSNT01. Following the same methodology outlined in the original report (and recorded in ORCLX-MAN-000123) to find PeopleSoft Backup Environments, Mandiant identified a total of 60 additional backup Environments on PSDEV02 and PSNT01 (see ORCLX-MAN-000344):

SAP TN Server	Number Of Backups
PSDEV02	59
PSNT01	1
TOTAL	60

Table L: Number of Backup Environments in Supplemental Data

263. With the addition of the 60 backup Environments Mandiant found on PSDEV02 and PSNT01, Mandiant has identified a total of approximately 3222 PeopleSoft backup Environments on the SAP TN servers. Table M, below, identifies the total number of PeopleSoft backup Environments found and the corresponding SAP TN Server containing these backups:

SAP TN Server	Number Of Backups
DCITBU02	2568
DCPSTEMP01	29
DCPSTEMP02	2
PSDEV01	48
PSDEV03	2
TN-FS01	9
TNWTS01	504
PSDEV02	59
PSNT01	1
TOTAL	3222

Table M: Number of Backup Environments found on SAP TN Servers

264. A listing of the 3222 backup Environments is contained in ORCLX-MAN-000361. All 3,222 backup Environments contain material protected by Oracle Registered Works, as discussed in Section X, below.

F.   JD EDWARDS ENTERPRISEONE APPLICATION SOFTWARE COPIES AND ENVIRONMENTS

265.   A JD Edwards EnterpriseOne application software environment comprises one or more of the following: a library of ".c" and ".h" files and a database containing application content.

266.   Mandiant installed a standalone copy of JD Edwards EnterpriseOne XE into a virtual machine running Microsoft Windows Server 2003.[128] Mandiant observed that the installation resulted in 13,147 unique Objects, all of which were ".c" and ".h" files located in subfolders underneath a B7333 folder.

267.   Mandiant's review of the Data Warehouse has established that SAP TN had at least 4 complete or partial copies of JD Edwards EnterpriseOne XE software. The chart below lists the number of unique Objects in subfolders underneath a B7333 folder (see eAppendix – "ORCLX-MAN-000121"), and the number of copies of those objects found on 4 of SAP TN servers:

Server	Unique hashes of XE .c and .h files found	Copies of XE .c and .h files found
PSJDDEV02	13,143	150,040
JDWSVR01	7882	109,279
DCJDENT02	7870	51,749
DCJDDEV03	7870	51,749

Table 28: The Number of JD Edwards XE .c and .h Files Found in B7333 Folders

268.   SAP TN's testimony corroborates that SAP TN created and used JD Edwards EnterpriseOne XE; specifically, SAP TN stated that it had created twelve Local Environments for JD Edwards EnterpriseOne XE, Cumulative Update 6.[129]

269.   Mandiant consulted with Edward Screven, Oracle's Chief Architect who has extensive knowledge of JD Edwards EnterpriseOne software. Mr. Screven confirmed Mandiant's understanding of the components of JD Edwards EnterpriseOne, and confirmed that JD Edwards EnterpriseOne software could be identified by looking in B7333 folders for copies of ".c" and ".h" files that would result from installation of JD Edwards EnterpriseOne XE.

270.   These copies and Local Environments contain material protected by Registered Works registered by Oracle, including TX 6-541-033, Initial release of JD Edwards EnterpriseOne XE; and, TX 6-541-048, Cumulative Update 8 for JD Edwards EnterpriseOne XE.[130]

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[128] Mandiant installed JD Edwards EnterpriseOne XE from Install Media produced as ORCL00424281.

[129] *See, e.g.,* Deposition of Mark Kreutz, February 19, 2008, at 63:4-17: Plaintiffs' Deposition Exhibit 52.

[130] Mr. Rice and Mr. Screven confirmed that Cumulative Update 8 for JD Edwards EnterpriseOne XE contains all or virtually all of Cumulative Update 6 for JD Edwards EnterpriseOne XE, admitted by SAP TN as having been applied to SAP TN's XE environments.

G. JD EDWARDS WORLD APPLICATION SOFTWARE ENVIRONMENTS AND COPIES

271.   A JD Edwards World application software environment comprises one or more libraries of source and object code.[131]

272.   On November 11, 2008, Mandiant and an Oracle employee with extensive knowledge of JD Edwards World software, Greg Story, inspected SAP TN's AS/400 in Bryan, Texas. In January 2009, Mandiant and Mr. Story further analyzed a restored version of this same AS/400.

273.   Mr. Story was able to confirm the existence of nine World A7.3, cumulative update 7 Environments, and three A8.1, cumulative update 6 Environments. These independent findings corroborate SAP TN's discovery response detailing the installed World Environments on its systems and SAP TN's testimony that SAP TN created and used nine World A7.3, cumulative update 7 Environments and three A8.1, cumulative update 6 Environments.[132]

274.   These copies and Local Environments contain material protected by Registered Works registered by Oracle, including TX 6-541-029, Initial release of JD Edwards World A7.3; TX 6-541-031, Cumulative Update 16 for JD Edwards World A7.3;[133] TX 6-541-047, Initial release of JD Edwards World A8.1; TX- 6-545-421, Cumulative Update 6 for JD Edwards World A8.1; and TX-6-541-043, Code Change for JD Edwards World A7.3.

H. SIEBEL LOCAL AND BACKUP CUSTOMER ENVIRONMENTS AT SAP TN

275.   A Siebel enterprise application software Environment comprises one or more of the following: Siebel server, database server, gateway server, database containing Siebel schema and/or content, and/or Siebel Tools.[134]

276.   Mandiant installed a standalone copy of Siebel 7.8 into a Virtual Machine running Microsoft Windows Server 2003.[135]   Mandiant also reviewed areas of the Data Warehouse, including Virtual Machines, believed to contain Siebel software.

277.   On October 28, 2009, Mandiant consulted with an Oracle employee with extensive knowledge of Siebel software, Dan Vardell. Mandiant reviewed with him the directory structures and contents of what appeared to be SAP TN's installations of Siebel within virtual machines, and confirmed the existence of several Siebel installations. Mr. Vardell confirmed that most installations of Siebel would result in folder structures that included a folder with a name beginning with "sea" or "sie" and containing a subfolder titled "siebsrvr" that contained file "siebsrvr.dll."

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[131] *See, e.g.,* Deposition of Mark Kreutz, February 19, 2008, at 8:19-21:25; Plaintiffs' Deposition Exhibits 45, 55.

[132] *See* SAP TN's Responses to Oracle USA, Inc.'s Second Set of Interrogatories, No. 13; Plaintiffs' Deposition Exhibits 45, 55.

[133] Mr. Screven confirmed that Cumulative Update 7 for JD Edwards World A7.3, admitted by SAP TN as having been applied to SAP TN's A7.3 Environments, is contained within and constitutes a substantial portion of Cumulative Update 16 for JD Edwards World A7.3.

[134] Additional components may exist for various versions of Siebel, such as Web engine, report server, Analytics server and/or BI warehouse. *See, e.g.,* Deposition of Michael Garafola, September 17, 2009, at 111:17-113:14.

[135] Mandiant installed Siebel from Install Media produced as ORCL00525229.

278. Mandiant's review of the Data Warehouse found 25 installations of Siebel, as listed in the table below.[136] Mandiant cross-referenced customer names with SAS customer records to determine that the installation below likely included full or partial copies of Siebel 7.0.4, 7.8, 7.7, 7.5, and 6.3, at minimum.

SAP TN Virtual Machine	Siebel Folder	Confirmed Installation
CSBP	sea704	Yes
CSBP.1	sea704	Yes
Everdream	siebel	Yes
Everdream.1	siebel	Yes
Everdream.2	siebel	Yes
FSC2	siebel	Yes
FSC2.1	siebel	Yes
FSC.1	sea78	Yes
FSC.2	sea78	Yes
FSCSales	siebel	Yes
FSCSales.1	siebel	Yes
FSCSales.2	siebel	Yes
MKS	sea77	Yes
MKS.1	sea77	Yes
MKS.2	sea77	Yes
Pomeroy	sea75	Tools[137]
Pomeroy.1	sea75	Tools
Pomeroy.2	sea75	Tools
Pomeroy.3	sea75	Tools
Pomeroy.4	sea75	Tools
Pomeroy.5	sea75	Tools
Pomeroy.6	sea75	Tools
StandardRegister	sea630	Yes
StandardRegister.1	sea630	Yes
StandardRegister.2	sea630	Yes

Table 29: SAP TN Virtual Machine With Siebel Installations

279. SAP TN's testimony corroborates that it created and used Siebel software; specifically, SAP TN stated that it had identified copies of Siebel Local Environments for 8 customers and Virtual Machines with Siebel Software copies for 6 customers.[138]

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[136] Mandiant tracked its review of SAP TN Virtual Machines using ORCLX-MAN-000147.

[137] All Pomeroy installations contained links to an external siebsrvr folder, and contained a local copy of other content, including Siebel Tools. Mr. Vardell and Mr. Screven confirmed that installations of Siebel Tools, alone, would constitute copies of a substantial portion of Siebel software.

[138] *See* Deposition of Michael Garafola, September 17, 2009 at 17:16-19:2; Plaintiffs' Deposition Exhibit 1623.

280. These copies and Local Environments contain material protected by Registered Works registered by Oracle, including TX 6-941-989, Siebel 6.3 Initial Release and Documentation; TX 6-941-988, Siebel 7.0.5 Initial Release and Documentation; TX 6-941-990, Siebel 7.5.2 Initial Release and Documentation; TX 6-941-993, Siebel 7.7.1 Initial Release and Documentation; and, TX 6-941-995, Siebel 7.8 Initial Release and Documentation.[139]

281. Based on Mandiant's analysis and review of the data, the inspection by Mr. Vardell, documents, and testimony, including the admissions of Defendants' corporate witnesses, it is my opinion that SAP TN had at least 18 full and 7 partial Local Environments of Oracle's Siebel enterprise application software on its computer systems. Further, these copies correspond to the registrations for Siebel software, including TX 6-941-989, Siebel 6.3 Initial Release and Documentation; TX 6-941-988, Siebel 7.0.5 Initial Release and Documentation; TX 6-941-990, Siebel 7.5.2 Initial Release and Documentation; TX 6-941-993, Siebel 7.7.1 Initial Release and Documentation; and, TX 6-941-995, Siebel 7.8 Initial Release and Documentation.

I.   COPIES OF ORACLE'S DATABASE SOFTWARE

282. SAP TN witnesses and documents indicate that having and using local copies of Oracle Database Software was "a critical need to support [SAP TN] customers running PeopleSoft on Oracle."[140]

283. Mandiant installed a copy of Oracle 10g: Release 2 database software and inspected the resulting directory structures and file contents, which include an "oradata" and "oraadmin" directories.[141]

284. On October 30, 2009, Mandiant consulted with an Oracle employee with extensive knowledge of Oracle Database Software, Russ Kawaguchi. We reviewed with him the directory structures and contents of Oracle Database Software, and confirmed the existence of several installations of Oracle Database Software on Data Warehouse.

285. Mandiant reviewed and recorded information about Oracle Database installations found in the Data Warehouse, including virtual machines produced as part of the Data Warehouse, as represented in the table below.[142]

SAP TN Server	Number of Oracle Database Installations
PSDEV01	86
FSC2	1
FSC2.1	1
FSC.1	1
FSC.2	1

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[139] Mr. Vardell and Mr. Screven confirmed that the vast majority of code from Siebel 6.0 would be included in Siebel 6.3.

[140] *See, e.g.*, Plaintiffs' Deposition Exhibit 1242; Deposition of Greg Nelson, December 3, 2009 at 261:17-265:7; Deposition of John Baugh, December 3, 2009 at 172:10-174:4.

[141] *Cf.* Deposition of John Baugh, December 3, 2009 at 176:8-177:5 (discussing oradata directories); Deposition of William Thomas, December 4, 2009, at 72:4-76:18 (same).

[142] Mandiant tracked its review of PSDEV01 using ORCLX-MAN-000159 and its review of SAP TN Virtual Machines using ORCLX-MAN-000147.

SAP TN Server	Number of Oracle Database Installations
TOTAL	90

Table 30: The Number of Database Installations Observed

286. Mandiant reviewed Pathfinder and recorded information about Oracle Database Environments, as represented in the table below.[143]

SAP TN Server	Oracle Database Release	Number of References in Pathfinder
DCPSTEMP01	9.2	1
DCPSTEMP01	9.2.0	3
DCPSTEMP01	9.2.0.4	1
DCPSTEMP01	9.2i	1
DCPSTEMP01	9i	3
DCPSTEMP02	10g	1
DCPSTEMP02	9.2.0	2
DCPSTEMP02	9.2.0.4	1
DCPSTEMP02	9.2.0.7	1
DCPSTEMP02	9i	2
PSDEV01	8.1	1
PSDEV01	8.1.7	21
PSDEV01	8.1.7.0	1
PSDEV01	8.1.7.4.0	1
PSDEV01	8i	1
PSDEV01	9.2	1
PSDEV01	9.2.0	21
PSDEV01	9.2.0.0	1
PSDEV01	9.2.0.4	4
PSDEV01	9.2.0.5[144]	1
PSDEV01	9.2.0.5.0 - 64bit	1
PSDEV01	9.2.0.6	12
PSDEV01	9.2.0.6.0	1
PSDEV01	9.2i	1
PSDEV01	9i	2
PSIBMAIX1	9.2.0.6	1
Total		**87**

Table 31: Summary of Database Information from Pathfinder

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[143] *See* ORCLX-MAN-000200.

[144] Recorded in Pathfinder as "9.2.05."

287. Combined, Mandiant's review and Pathfinder's records identify at least 107 installations of Oracle Database Software by adding additional installations noted in Pathfinder not reflected by Mandiant's analysis. This minimum number of installations was calculated by adding the number of Oracle Database installations observed in Table 30 to the number of Oracle Database installations on machines other than PSDEV01 reported in Table 31.

288. SAP TN disclosed on November 11, 2009, that 13 additional installations of Oracle Database Software were present on SAP TN's servers.[145] Mandiant determined that two of the 13 identified installations were not previously counted in Mandiant's analysis. Mandiant was able to confirm the presence of these installations, based upon Defendants' stated methodology of reviewing network/log/sqlnet.log files, and upon Mandiant's review of the Data Warehouse.[146] The following table identifies the two additional installations disclosed by SAP TN:

SAP TN Server	Installed Oracle Version	SAP TN Full Path
DCSBLPROD03	9.2.0.4.0	DCSBLPROD03\C\oracle\9.2\network\log\sqlnet.log
PSDEV02(PSIBMAIX1)	8.1.7.4.0	\d01\app\oracle\product\8.1.7\network\log\sqlnet.log

Table N: Additional Installations of Oracle Database Software

289. Including the two installations described in Table N, Mandiant has identified approximately 109 installations of Oracle Database software based on Mandiant's review of Data Warehouse, Pathfinder, and Defendants' Responses and Objections to Plaintiffs' Fifth Set of Interrogatories to Defendant Tomorrow Now, Inc., and Fourth Set of Interrogatories to Defendants SAP America, Inc. and SAP AG, Responses to Interrogatories 122 and 124.

290. SAP TN had and used installations of Oracle Database Software.[147] SAP TN downloaded Oracle Database Install Media from Oracle's websites and installed Oracle Database on multiple servers and virtual machines.[148] These Oracle Database installations were used to support as many as 40% of SAP TN's customers.[149] SAP TN also downloaded and applied patches to these Oracle Database installations.[150]

291. These installations of Oracle Database Software contain material protected by Registered Works registered by Oracle, including TX 5-222-106, Oracle 8i Enterprise Edition, release 2 (8.1.6); TX 5-392-842, Oracle Relational Database Management System (RDBMS): Release 8.0.4; TX 5-392-861, Oracle Relational Database Management System (RDBMS), Release 8.0.5; TX 5-673-281, Oracle9i Database Enterprise : Edition Release

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[145] *See* Defendants' Responses and Objections to Plaintiffs' Fifth Set of Interrogatories to Defendant Tomorrow Now, Inc., and Fourth Set of Interrogatories to Defendants SAP America, Inc. and SAP AG Responses to Interrogatories 122 and 124.

[146] Mandiant additionally found 321 sqlnet.log files that do not appear to directly correlate to installations of Oracle database on SAP TN's servers. See ORCLX-MAN-000379.

[147] *See, e.g.*, Defendants' Response to Plaintiffs' Fifth Set of Interrogatories, Nos.122, 123; Defendants' Response to Plaintiffs' Fourth Set of Requests for Admission, Nos. 1-4; *see also, e.g.,* Plaintiffs' Deposition Exhibit 1544; Deposition of John Baugh, February 6, 2008, at 36:9-37:12; Deposition of George Lester, April 23, 2009, at 19:12-21:21.

[148] Deposition of John Baugh, December 3, 2009 at 166:19-168:8, 183:6-186:22, 205:17-207:25, 228:1-14, 230:22-239:9; Deposition of Bill Thomas, December 4, 2009 at 6:16-154, 23:17-38:22, 53:19-54:2, and 72:4-76:18.

[149] *See, e.g.*, Deposition of John Baugh, December 3, 2009 at 175:19-176:2.

[150] *See, e.g.*, Deposition of John Baugh, December 3, 2009 at 169:6-15; *id.* at 180:18-23.

1; TX 5-673-282, Oracle9i Database Enterprise : Edition Release 2; TX 6-938-648, Oracle Database 10g: Release 1; TX 6-942-003, Oracle Database 10g: Release 2.

VIII. CONCLUSION 3: ANALYSIS OF SAP TN FIX DEVELOPMENT AND DELIVERY CONFIRMED SIGNIFICANT CROSS-USE AND CONTAMINATION

292.   Mandiant performed an extensive analysis of the evidence relating to how SAP TN used Oracle Enterprise Application and Database Software and downloaded SSMs to prepare and deliver the support materials for its customers.   Mandiant was instructed to assume that all Fixes developed and delivered to a customer should only be developed, tested and produced using that customer's licensed Oracle Enterprise Application Software, as reflected in SAP TN's own Compliance Guidelines, prepared after this litigation began. I have also been instructed to assume that, even if an Environment assigned to a specific customer was used for all stages of Fix-delivery for that customer's Fix, that the Fix is Contaminated if that Environment was also used to support other customers as part of the Fix-delivery process for that same Fix ID.

293.   Because it constituted most of SAP TN's support deliverables, Mandiant focused on SAP TN's support of the PeopleSoft HRMS product line. More than 90% of SAP TN Fixes were PeopleSoft HRMS Fixes and more than 79% of SAP TN's Oracle Enterprise Software Application Environments were for PeopleSoft HRMS. Specifically, of the approximately 1,928 Fix IDs recorded in SAS, 1,761 were for PeopleSoft HRMS Fixes and Bundles. Approximately 2,942 of SAP TN's approximately 3,742 Environments were PeopleSoft HRMS Environments.[151] These percentages led Mandiant to believe that analysis of SAP TN's HRMS Fixes would provide the most insight into SAP TN's development process.

294.   Mandiant examined the available data in Delivered Updates and Fixes, SAS, BakTrak, and the Data Warehouse, and identified measures relevant to analyzing SAP TN's Fix-delivery process. These measures captured information concerning the PeopleSoft HRMS Objects that SAP TN copied, modified, and distributed to its customers, the number of customers who received Fixes, the number of Fix Objects that were delivered to customers, and the occasions where the Oracle Enterprise Application Software of one customer was used to create Fixes to support other customers.

295.   A summary of Mandiant's PeopleSoft HRMS Fix analysis can be found in Appendix K. This analysis revealed that most Fixes delivered by SAP TN to customers were affected by the Cross-Use of Oracle Enterprise Application Software and/or SSM downloads originally obtained on behalf of another customer. In reaching these opinions, and as explained below, Mandiant relied on, and worked with, statistical expert Dr. Daniel Levy to extrapolate the initial factual findings developed by Mandiant to better assess the actual extent of SAP TN's activities.

A.   SUMMARY OF OPINIONS

1.   SAP TN Improperly Used Environments to Generate Both Retrofit Support Model Fixes and Critical Support Model Fixes

296.   It is my opinion that SAP TN's support models both resulted in Fixes being Contaminated (in one or more ways) by improper Environment use. Specifically, Mandiant identified (via the DAT Contamination and Hash Contamination measures):

1.   94% of the CSM Fixes were generated from improperly used Environments.

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[151] 2615 of 3162 PeopleSoft Environment backups and 327 of 549 "live environments" were copies of PeopleSoft HRMS environments. There were an additional 25 complete or partial installations of Siebel, 4 of JD Edwards EnterpriseOne, and 2 of JD Edwards World observed. See Section VII and eAppendix - "ORCLX-MAN-000160."

2.   90% of the RSM Fixes were generated from improperly used Environments.

Adding Source Group Contamination as well as Cross-Use Contamination and Additional-Customer Contamination calculated for a sample of Fixes[152] yielded:

3.   Between 98.73% and 99.57% of the CSM Fixes were generated with improperly used Environments.

4.   Between 74.64% and 99.74% of the RSM Fixes were generated with improperly used Environments.

2.   97.5% of DAT files in Fixes Were Developed Using Generic Environments or Incorrect Client-Labeled Environments

297.   Many Fixes to PeopleSoft HRMS include a data change, meaning that application of the Fix to an Environment modifies the contents or the structure of the database in that Environment. For PeopleSoft HRMS, data changes commonly update an Environment to account for new or modified legislation or regulation. A Fix almost always effects a data change using a DAT File. A DAT File contains database modifications created in and exported from a PeopleSoft Environment using PeopleTools.

298.   Mandiant was able to identify 6,508 data changes delivered to approximately 123 unique SAP TN clients. Out of the 123 SAP TN clients, approximately 120 clients received at least one data change from a Generic Environment. Additionally, 39 clients received at least one data change from the wrong client-labeled Environment. Overall, 121 clients received data changes from either a Generic or incorrect client-labeled Environment.

- At least 98% of the clients receiving a data change received at least one change created from a Generic or incorrect client labeled Environment.

299.   The following represents the volume of data changes.

- 96.1% of all data changes were created from a Generic Environment. Overall, 6,256 DAT Files were identified as created on Generic Environments. An example would be the Environment "D831DATM" used to support 44 different clients.

- 1.4% of all data changes were created from incorrect client-labeled Environments. Overall, 92 DAT Files were identified as mismatches. An example would be the Environment H881COHM, created by SAP TN on the behalf of City of Huntsville. The H881COHM Environment was used to support 13 additional clients[153] besides City of Huntsville:

    o   Baker Botts LLP ("BKB")
    o   CompuCom ("CCO")
    o   Children's Health System of Alabama ("CHS")
    o   CSK Auto ("CSK")
    o   Delta Dental Plan of Michigan ("DDM")
    o   East Bay Municipal Utility District ("EBM")
    o   GKN Driveline North America Inc. ("GKN")
    o   Kent County Michigan ("KCM")

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[152] The sample of Fixes was selected by Dr. Levy. The statistics were provided to Mandiant by Dr. Levy based on sample data provided by Mandiant.

[153] For a sample listing of customers and contract dates, see Appendix J.

- o   Mutual of Omaha ("MOH")
- o   Oxford Global Resources, Inc. ("OXF")
- o   Philadelphia Corporation of Aging ("PCA")
- o   Remy International, Inc. ("RII")
- o   Waste Management Resources, LLP ("WMI")

300.   A full discussion of Mandiant's analysis of data changes can be found in Appendix K.

301.   It is my opinion that a Fix containing a DAT file is Contaminated unless the DAT file was generated in the recipient's customer-labeled Environment.

302.   It is also my opinion that the use of an Environment created from one customer's Install Media to create a DAT File for another customer constitutes Cross-use of that Environment.

3.   The Majority of Fixes Were Contaminated Because One or More Component Fix Objects Were Delivered to Multiple Customers

303.   For every file that can appear on a computer, an MD5 Hash that uniquely identifies the file's contents can be calculated. This hash ignores the file's name, date of creation and other metadata, and is calculated solely from the file's contents. Files with the same MD5 Hash are exact duplicates of each other. In my opinion, it is extraordinarily unlikely that two File-based Objects that were developed or modified independently would have the same MD5 Hash. Inside every DAT File, PeopleTools records the name of the Environment used to generate the DAT File and the time of generation of the DAT File down to the second. In my opinion, it is extraordinarily unlikely that two DAT Files would have the same MD5 Hash because it would require that the files were generated from identically named Environments at exactly the same second.

304.   It is my opinion that whenever two or more customers receive a File-based Object or DAT file with the same MD5 Hash, the customers have received an Object that was generated once by SAP TN. Such customers have not received a Fix independently developed for each of them, using only their own software.

4.   The Majority of Fixes Were Contaminated Because SAP TN's Development and Testing Documentation Revealed that the Fixes Were Generated or Tested Through Cross-Use of Environments

305.   SAP TN's documentation sometimes alludes to the planned Cross-Use of Environments with respect to a given Fix, and lists the source groups for which development and/or testing would occur in the documentation related to each Fix.[154] The excerpt below from the test plan for the CSS-TN-1116067702 Fix is an example showing the customers SAP TN assigned to each source group for common development.

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[154] *See, e.g.,* Plaintiffs' Deposition Exhibit 291.

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11/22/2006 09:46:49 AM CST Hadi Arakib: Development
complete for 751C (ADV, BSC, EDE, HVH, ICF, NCL, SBH,
TEL, TPA, UNI).

702 (RHI).
751G Source1 (UOM, CCW, COA), Source2 (ACT, MOA).
8SP1 Source1 (RRN,SPL) Source2 (BAX, BDG,MCC, SPG),
Source3 (QGI),  Source4 ( CAG), Source5 (BGP).
83SP1 Source1( ARM, SPS), Source2 (FLI), Source3 (AFL,
HII, OLN, PAS, WEN), Source4 (FCS, TSU), Source5
(RWC), Source6 (ACE), Source7 (TAI), Source8 (STA),
Source9 (BLS), Source10 (LFS), Source11 (CCI).
88SP1 Source1 (CHS, PCA, COH), Source2 (BKB, CSK,
DDM, KCM, MOH, OXF, RII), Source2 (CCO, EBM,WMI).
890 (GKN).
```

Table 32: Excerpt from CSS-TN-1116067702 Test Plan, from the TN-FS01_F: "Consultant Docs and Templates\Fix Delivery Work Documents\TN-PY06DEC\Individual Fix Testing\TN-1116067702\TN-1116067702 Suffix of an employee name is a separate box on Form W-2.doc"

B.   ANALYSES OF SELECTED FIXES

306.   This section provides a set of examples that demonstrate the data analysis process and introduce the 44 measures discussed in more detail in Appendix K. The examples describe the analyses that Mandiant performed. The analyses are conservative because Mandiant assumed during our HRMS Fix analysis that all previous Fixes and Updates applied to customer-specific Environments were appropriately collected and applied (not obtained from other customers' credentials or software).

1.   Analysis of Critical 646 (CSS-TN-1116067702)

307.   Critical 646 corresponds to the CSM Fix ID CSS-TN-1116067702. According to the corresponding Master Fix Record in SAS, the short description for this Fix is "Suffix of an employee's name is a separate box on Form W-2." According to SAS, this Fix was developed in late 2006 and was delivered in the PY06DEC Bundle.

a)   3612 Copies of Associated Files

308.   Mandiant searched Delivered Updates and Fixes for files containing the string "1116067702" and files underneath the directory containing the string "1116067702." Whenever the string was contained in a DMS file, Mandiant did a second pass, looking for DAT files with paths and names that matched the DAT file references within that DMS file. After creating this set of files, Mandiant removed any file where another Fix had been a more recent source of modifications. See Appendix K for further detail. All of the files in the set that were not excluded are Associated Files for critical 646. Mandiant determined, for critical 646, that 18 unique SQR, SQC and COBOL files (measure 104), 8 unique DAT files (measure 142), and 2 unique DMS files (measure 143) were Associated Files, for a total of 28 unique Associated Files (measure 106). Each of these unique Associated Files may have been delivered to one or more customers. For critical 646, 199 Associated Files in total were delivered to customers (measure 108) in First Deliverables, which here were zip files containing the Associated Files. For critical 646,

another folder or drive on Delivered Updates and Fixes included a duplicate of each of the 199 Associated Files (measure 109).

309.   These same unique Associated Files appeared throughout the Data Warehouse.[155] An additional 3209 duplicate copies were found in the Data Warehouse: 1274 duplicate copies of Associated Files (measure 110), 204 additional copies of Associated Files in duplicates of First Deliverables (measure 111), and 1731 additional copies of Associated Files in local PeopleSoft HRMS environments backups (measure 112). BakTrak reveals that an additional 5 duplicate copies of an Object were contained in PeopleSoft HRMS Environment backups that were created at one time but deleted (measure 113). For this Fix, no Objects were attached to the SAS Master Fix Record (measure 114). A grand total of 3612 Associated Files and duplicates were found on SAP TN's machines (measure 133).

b)   58 Recipient Customers

310.   Mandiant examined Delivered Updates and Fixes to determine which of SAP TN's customers received First Deliverables containing Associated Files. For critical 646, First Deliverables for 58 customers were found (measure 118). For this Fix, no additional deliveries to customers were recorded in SAS (measure 119), so there were a total of 58 recipient customers (measure 120). While the Application Release field in SAS reported that this Fix was intended for customers only on one version of PeopleSoft HRMS (measure 101), examination of customer support contracts revealed that the 58 recipient customers were supported on nine different versions of PeopleSoft HRMS(measure 102). Though SAS reports the status of the Fix as "Open - Bundle Development" (measure 103), based on analysis of Delivered Updates and Fixes, the Fix was delivered to customers.

c)   30 Environments

311.   Four Local Environments (measure 115) were used in the creation of the DAT Associated Files for critical 646 that were found on Delivered Updates and Fixes. Use of 27 total environments was documented in testing records (measure 116). Unit testing records for this Fix revealed that 23 different Environments were used to unit test. Five Environments (including one of the 23, H702RHIM) were used to individual fix test this Fix. A grand total of 30 distinct Environments were observed as having been used for critical 646 (measure 117).[156]

d)   100% of First Deliverables Were Contaminated

312.   Though 30 Environments were used for development and testing, each Environment was used at a different step in the fix delivery process for multiple customers, rather than being used throughout for a specific customer. Furthermore, several of the Environments used were not created from the software of any recipient customer of this Fix.

313.   For the creation of DAT files, the four Environments used were H702RHIM, D751DATM, D831DATM, and D881DATM (measure 115A). 56 of the recipient customers received a DAT file from a Generic, DATM Environment or, more generally, from an Environment where the customer's three-letter code does not appear in the Environment name. All

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[155] Some portions of the Data Warehouse search involved only 27 of the 28 Associated Files (measure 107). Because certain areas of the Data Warehouse are not organized by customer, and one Associated File was associated with critical 646 only for certain customers, that file was excluded from this portion of the analysis.

[156] For critical 646, bundle-testing documentation was also used to determine the environments used.

56 of these recipient customers therefore received First Deliverables Contaminated by DAT Contamination due to the receipt of a DAT file not generated from Environments named for them (measure 122).[157]

314.   H702RHIM was the only Environment used for unit testing and individual fix testing. That means that the only customer that might have received an uncontaminated First Deliverables for critical 646 with respect to SAP TN's testing process was Robert Half International, Inc. (RHI). However, H702RHIM was not built from the software of RHI or any other recipient customer for this Fix.[158] Therefore, all 58 recipient customers received First Deliverables resulting from Cross-Use Contamination because they were not tested solely in Environments named for them (measure 123).

315.   A review of SAS and unit testing documents shows that 45 recipient customers were members of a source group of size greater than one. According to the assumptions regarding source groups under which Mandiant operated, all 45 of these recipient customers received Contaminated First Deliverables resulting from Source Group Contamination (measure 124), because they were in source groups of size greater than one.

316.   MD5 Hash review of the files on Delivered Updates and Fixes reveals that many customers received identical Associated Files, resulting in Hash Contamination. 57 of the 58 recipient customers received at least one file exactly identical to a file received by another recipient customer. To summarize, looking only at Delivered Updates and Fixes, 98% of recipient customers received a Contaminated First Deliverable, either because of DAT Contamination, Hash Contamination, or both (measure 130). Adding in the analysis of SAS and Data Warehouse testing records, 100% of recipient customers received a Contaminated First Deliverable because generic Environments or Environments built from the software of other customers were used to create the Fix for each customer, as captured by the analysis of DAT Contamination, Hash Contamination, Cross-Use Contamination, and Source Group Contamination for this Fix (measure 131).

e)   73% of SQR, SQC, COBOL, and DAT Associated Files Were Contaminated

317.   19 of the 26 total unique SQR, SQC, COBOL, and DAT Associated Files (measure 104 + measure 142) were delivered to more than one recipient customer, resulting in Hash Contamination (measure 135). Seven of those 19 were DAT files that, independently, were sources of DAT Contamination (measure 136). Overall, 73% of the unique SQR, SQC, COBOL, and DAT Associated Files for critical 646 were associated with Hash Contamination or DAT Contamination (measure 138). Looking solely at DAT files, seven

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[157] I am aware that Defendants have asserted that D831DATM may have been created from Install Media received from Rentway Corp. (RWC). *See* Defendants' Reponses to Oracle USA, Inc.'s Second Set of Interrogatories, No. 14. However, a review of BakTrak shows that D831DATM appears to have been created from HR831DAT, which in turn appears to have been created from a February 4, 2004 backup of HR831DMO. According to SAS, SAP TN did not receive RWC's Install Media until September 15, 2004. It is therefore my opinion that the source of the Install Media used to create D831DATM is unknown.

[158] Defendants have admitted that H702RHIM was built either from Safeway's Washington Gas Light's software, though they do not know which. *See, e.g.*, Defendants' Responses to Oracle USA, Inc.'s Second Set of Interrogatories, No. 14 ("Further, TomorrowNow reasonably believes that the Robert Half environment was created from the HR75105B environment. *See* TN-OR 06125330, TN (Disc).202 BakTrak\Search Restore Log. The HR75105B environment was likely created from PeopleSoft application provide by either Safeway or Washington Gas Light. *See* May 12, 2009 Deposition of Catherine Hyde at 32:3-22."); *see also, e.g.,* Deposition of Catherine Hyde, May 12, 2009 at 45:18-46:4; Plaintiffs' Deposition Exhibit 1259; Defendants' Responses to Plaintiffs' Fourth Set of Interrogatories to SAP TN, No. 82 (adopting Ms. Hyde's testimony as SAP TN's position).

of the eight DAT files, or 87.5%, were Contaminated by DAT Contamination (measure 144).

2. Analysis of Critical 1099 (CSS-TN-1106078243)

318. Critical 1099 corresponds to Fix ID CSS-TN-1106078243. According to the Master Fix Record in SAS, the short description for this Fix is "California - Withholding Table Changes effective 01/01/2008," the Fix was developed in late 2007, and the Fix was delivered in the PY07DEC Bundle.

a) 772 Copies of Associated Files

319. Mandiant searched Delivered Updates and Fixes for Associated Files based upon the string "1106078243" as described above and determined that 9 unique DAT and DMS files (measure 105) were Associated Files for critical 1099.[159] For critical 1099, 130 Associated Files in total were delivered to customers (measure 108) in First Deliverables, which were zip files containing the Associated Files. Another folder or drive on Delivered Updates and Fixes included a duplicate of each of the 130 Associated Files (measure 109).

320. These same unique Associated Files appeared throughout the Data Warehouse. An additional 394 duplicate copies were found in the Data Warehouse: 138 duplicate copies of Associated Files (measure 110) and 256 additional copies of Associated Files in duplicates of First Deliverables (measure 111). BakTrak reveals that an additional 118 duplicate copies of an Object were contained in local PeopleSoft HRMS Environment backups that were created at one time but deleted (measure 113). A grand total of 772 Associated Files and duplicates are or were present on SAP TN's machines (measure 133).

b) 65 Recipient Customers

321. Mandiant examined Delivered Updates and Fixes to determine which of SAP TN's customers received First Deliverables containing Associated Files. For critical 1099, First Deliverables for 65 customers were found (measure 118, measure 120). While the Application Release field in SAS does not specify the PeopleSoft HRMS versions for which this Fix was intended to be developed (measure 101), examination of customer support contracts revealed that the 65 recipient customers were supported on 10 different versions of PeopleSoft HRMS (measure 102).

c) 10 Environments

322. Four Local Environments (measure 115) were used in the creation of the 6 DAT Associated Files (measure 142) for critical 1099 that were found on Delivered Updates and Fixes. Testing records for this Fix reveal use of 6 additional Environments (measure 116), all of which were used for individual fix testing. A grand total of 10 distinct Environments were observed as having been used for critical 1099 (measure 117).

d) 100% of First Deliverables Were Contaminated

323. Though ten Environments were used, each Environment was used at a different step in the Fix delivery process for multiple customers, rather than being used throughout for a

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[159] There were no Cobol, SQR, or SQC Associated Files for critical 1099 (measure 104).

specific customer. Furthermore, several of the Environments used were not created from the software of any recipient customer of this Fix.

324. For the creation of DAT files, the four Environments used were D702DATM, D751DATM, D831DATM, and D881DATM (measure 115A). None of these four Local Environments were known to have been created from the software of any customer who received this Fix. All 65 of the recipient customers therefore received First Deliverables Contaminated due to DAT Contamination (measure 122).

325. Individual fix testing records for these Fixes revealed that six different Environments were used to individually fix test this Fix: H702RHIM, H751ACTM, H801SPLO, H831BLSD, H881RIIO, and H890GKNM. Neither H702RHIM nor H751ACTM was built from the software of any recipient customer for this Fix.[160] Mandiant did not find evidence that critical 1099 was ever delivered to GKN Driveline North America, Inc. (GKN). Therefore, at least 62 of the 65 recipient customers received First Deliverables Contaminated by Cross-Use (measure 123).

326. For the three (3) remaining customers, Suburban Propane L.P. (SPL), Remy International (RII), and Big Lots Stores Inc. (BLS), each of their customer-labeled Environments were used to support other customers who received Critical 1099. H831BLSD, associated with Big Lots Stores, Inc. (BLS), was the only Environment where individual fix testing occurred for the HRMS 8.3 SP1 release. For the other 15 customers being supported by SAP TN for HRMS 8.3 SP1,[161] there was no separate individual fix testing. Therefore, it is my opinion that those 15 customers received a Fix that SAP TN created through reliance on the individual fix testing of BLS's HRMS 8.3 SP1 Environment. The same is true with respect to H801SPLO, the associated Environment for Suburban Propane, L.P. (SPL), where 11 additional HRMS 8.0 SP1 customers benefited from the testing performed on H801SPLO.[162] With respect to H881RIIO, the associated Environment for Remy International, Inc. (RII), 10 additional HRMS 8.8 SP1 clients benefited from the testing performed on H881RIIO.[163] Taking into account SAP TN's reliance upon use of one customer-specific Environment to create a Fix delivered to additional customers, all 65 recipient customers received First Deliverables Contaminated by Cross-Use or use for additional customers (measure 126).

327. Review of the files on Delivered Updates and Fixes reveals that many customers received identical Associated Files. 62 of the 65 recipient customers received a First Deliverable with Hash Contamination (measure 125), because at least one file in the First Deliverable was exactly identical to a file received by another recipient customer.

328. To summarize, looking only at Delivered Updates and Fixes, 100% of recipient customers received a Contaminated First Deliverable, either because of DAT Contamination, Hash Contamination, or both (measure 130).

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[160] Defendants have stated their belief that H751ACTM was created from the Install Media of North Carolina State (NCS). *See, e.g.*, Defendants ' Responses to Oracle USA, Inc.'s Second Set of Interrogatories, No. 14.

[161] Alcon Laboratories, Inc. (ALC); ArvinMeritor, Inc. (ARM); CC Industries, Inc. (CCI); Fairchild Semiconductor (FCS); Harley Davidson, Inc. (HDI); Honeywell International, Inc. (HON); J.B. Hunt Transport Inc. (JBH), Linc Facility Services LLC (LFS); Olin Corporation (OLN); Shands Healthcare (SHN); LS Management Inc. (STA); Toshiba America Information Systems (TAI); Tropical Shipping USA, LLC (TSU); Wakefern Food Corporation (WAK); and, Wendy's (WEN).

[162] A. O. Smith (AOS), Baxter International (BAX), Blue Diamond Growers (BDG), Borders Group (BGP), ConAgra Foods (CAG), Children's Health System of Alabama (CHS), McClennan County (MCC), Quad Graphics (QGI), Ross Dress for Less (ROS), Richmond Power & Light (RPL), Simon Property Group(SPG).

[163]Baker Botts (BKB), CompuCom (CCO), City of Huntsville (COH), Delta Dental Plan of Michigan (DDM), East Bay Municipal Utility District (EBM), Kent County Michigan (KCM), Markel Corporation (MKL), Oklahoma Publishing Corporation (OPC), Philadelphia Corporation of Aging (PCA), Parkview Health (PVW).

e)   100% of DAT Associated Files Were Contaminated

329.   Looking at the DAT Associated Files, each of the six were sources of DAT Contamination (measure 136). Three of those six were also delivered to more than one recipient customer, independently making them sources of Hash Contamination (measure 135). Overall, 100% of the unique DAT Associated Files for critical 1099 were associated with Hash Contamination or DAT Contamination (measure 138).

3.   Analysis of Retrofit 127 (0225046346)

330.   Retrofit 127 corresponds to Fix ID 0225046346. According to the corresponding Master Fix Record in SAS, the short description for this Fix is "W-2C (2003) - locality name and incorrect wages printing in boxes 18 and 19," the Fix was developed in early 2004, and the Fix was delivered both individually and as part of the 2004B-702C, 2004B-702P, 2004B-751C, and 2004B-751G Bundles.

a)   425 Copies of Associated Files

331.   Mandiant searched Delivered Updates and Fixes for Associated Files based upon the string "0225046346" as described above and determined that 6 unique SQR, SQC and Cobol files (measure 104) were Associated Files for retrofit 127.[164]

332.   For retrofit 127, 17 Associated Files in total were delivered to customers (measure 108) in First Deliverables, which were zip files containing the Associated Files. For retrofit 127, other folders and drives on Delivered Updates and Fixes included duplicates of some of these files, leading to 45 additional Associated Files (measure 109).

333.   An additional 359 duplicate copies of these Associated Files were found in the Data Warehouse: 174 duplicate copies of Associated Files (measure 110), 23 additional copies of Associated Files in duplicates of First Deliverables (measure 111), and 162 additional copies of Associated Files in local PeopleSoft HRMS Environments backups (measure 112). Four additional Associated Files were attached to the SAS Master Fix Record (measure 114). A grand total of 425 Associated Files and duplicates are or were present on SAP TN's machines (measure 134), four in SAS (measure 114) and 421 in Delivered Updates and Fixes or Data Warehouse (measure 133).

b)   23 Recipient Customers

334.   Mandiant examined Delivered Updates and Fixes to determine which of SAP TN's customers received First Deliverables containing Associated Files. For retrofit 127, First Deliverables for 8 customers were found (measure 118). A review of the Master Fix Record in SAS, however, shows delivery of an Identified Deliverable for 15 additional customers (measure 119), bringing the number of Customer Recipients to 23 (measure 120). While the Application Release field in SAS reported that this Fix was intended for customers only on two versions of PeopleSoft HRMS (measure 101), examination of customer support contracts revealed that the 23 recipient customers were supported on five different versions of PeopleSoft HRMS (measure 102).

c)   4 Environments

335.   Documentation confirms that four different Environments were used to create retrofit 127 (measure 117), all apparently for unit testing.[165]

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[164] There were no DAT or DMS Associated Files for retrofit 127 (measure 105).

d)   100% of First Deliverables Were Contaminated

336.   Unit testing records[166] for these Fixes revealed that these 23 customers received Fixes tested using four different Environments: HR75104A, HR751TST, HR702TST, and HG75104B. HR75104A, HR751TST, and HR702TST were created from Oracle software received from Safeway (SAF) or Washington Gas Light (WGL). Since both SAF and WGL were recipient customers, Mandiant assumed that one of these two customers received the Fix created using an Environment originally created from that customer's own software. HG75104B was created from Oracle software received from North Carolina State University (NCS), which received Retrofit 127. However, it appears in the testing document reviewed that HG75104B was used only to test a Fix relating to HRMS 7.51 Education & Government. As SAP TN supported NCS on HRMS 7.02 Public Sector, HG75104B was not used to support NCS. 22 of the 23 recipient customers therefore received First Deliverables or Identified Deliverables Contaminated by Cross-Use (measure 123). When both Cross-Use and use for additional customers (measure 126) is considered, all 23 recipient customers received a Contaminated First Deliverable or Identified Deliverable (measure 126), since the Environment originally built from either SAF's or WGL's install media was used to test the Fix for both SAF and WGL, at minimum.

337.   Review of the files on Delivered Updates and Fixes reveals that many customers received identical Associated Files. Of the eight customers who received a First Deliverable from Delivered Updates and Fixes, seven of them received a First Deliverable with Hash Contamination (measure 125), because at least one file in the First Deliverable is exactly identical to a file received by another recipient customer.

338.   Mandiant's review of the Delivered Updates and Fixes revealed 88% (7 of the 8 customers Mandiant found First Deliverables for) of the recipient customers that received a First Deliverable found received a Contaminated First Deliverable due to Hash Contamination (measure 130). Accounting for Cross-Use Contamination, and further taking into account those recipient customers identified in SAS as receiving an Identified Deliverable, 91% of recipient customers received a Contaminated First or Identified Deliverable (measure 131). When Additional-Customer Contamination is considered, 100% of recipient customers (measure 132) received a Contaminated First or Identified Deliverable.

4.   Analysis of Retrofit 201 (2005C-751G)

339.   Retrofit 201 corresponds to Fix ID 2005C-751G. According to the corresponding Master Fix Record in SAS, the short description for this Fix is "TomorrowNow Tax Update 2005C-751G for PeopleSoft HRMS 7.51 Education & Government," and the Fix was developed in mid-2005.

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[165] The test document attached to the Master Fix Record in SAS for this Fix (for PeopleSoft HRMS 7.51 E&G) confirming the use of HG75104B is ambiguous as to whether it was used for unit testing or individual fix testing. Mandiant assumed that it was used for unit testing.

[166] See previous footnote regarding the test document for HG75104B.

Figure 17: SAS Master Fix Record for 2005C-751G

340. As discussed in Appendix K, the population of PeopleSoft HRMS Fixes examined in this analysis excludes critical support Bundles but includes retrofit Bundles. This is because, for critical support Bundles, SAP TN appears to assign a Fix ID to each task to be completed. In the retrofit model, each task is assigned either an SAP TN Fix ID or a PeopleSoft report ID, as shown in the figure below, where "1254392000" and "1273051000" are PeopleSoft Report IDs. If the retrofit Bundles had not been included in the population, therefore, Fix Objects associated with PeopleSoft report IDs but not SAP TN Fix IDs would not have been counted. The following is an excerpt of the form UTH-TN-2005C-751G-Notes.doc, delivered as part of 2005C-751G to UTH:

Report ID	Description
1254392000	Report ID 1254392000 modifies PSPPYNET.DMS to select only PS_PAY_CHECK data with a PAYCHECK_STATUS of "C" (for calculated) or "V" (for reversing check) in order to correctly evaluate which supplemental rate should be applied when an employee receives multiple off-cycle payments for supplemental wages. The new two-tier U.S. federal supplemental tax rate requirement effective January 1, 2005 specifies that any taxable supplemental wage payments exceeding $1 million during the calendar year must be taxed at the new higher rate of 35% instead of at the lower supplemental rate of 25%. Prior to the modifications, in some situations, the higher tax rate was applied incorrectly if an Off-cycle check for an employee was confirmed and then a subsequent off-cycle check was calculated for the same pay period end date.
TN-0411053569	TN-0411053569 redelivers PSPPYNET.DMS to eliminate EMPL_RCD field name from a select statement.
1273051000	Report ID 1273051000 modifies PSPPYGRP.DMS and PSPPYNET.DMS to improve system performance related to supporting the new two-tier U.S. federal supplemental tax rates that became effective January 1, 2005.

Table 33: Excerpt from UTH-TN-2005C-751G-Notes.doc, delivered as part of 2005C-751G to UTH

a) 121 Copies of Associated Files

341. Mandiant searched Delivered Updates and Fixes for Associated Files based upon the string "2005C-751G" as described above and determined that 1 unique SQR, SQC or Cobol files (measure 104), four DAT files (measure 142), and three DMS files (measure 143) were Associated Files for retrofit 201.[167] Each of these unique Associated Files may have been delivered to one or more customers. For retrofit 201, 31 Associated Files in total were delivered to customers (measure 108) in First Deliverables, which here were zip files containing the Associated Files. Other folders and drives on Delivered Updates and Fixes included duplicates of some of these files, leading to 60 additional Associated Files (measure 109).

342. Looking beyond Delivered Updates and Fixes, these same unique Associated Files appeared throughout the Data Warehouse. An additional 30 copies of Associated Files were found in duplicates of First Deliverables (measure 111). A grand total of 121 Associated Files and duplicates were present on SAP TN's machines (measure 134).

b) 16 Recipient Customers

343. Mandiant examined Delivered Updates and Fixes to determine which of SAP TN's customers received First Deliverables containing Associated Files. For retrofit 201, First Deliverables for 16 customers were found (measure 118). The Application Release field in SAS reported that this Fix was intended for customers only on one version of PeopleSoft HRMS (measure 101), 7.51. However, 14 of the 16 customers received an Associated File through an individual Fix, including customer University Of Massachusetts (UOM), whose only SAP TN support contract was for Student Administration 7.6.[168] Therefore, customers on 2 different versions received the Fix (measure 102).

c) 6 Environments

344. Testing documentation and project plans with items marked as completed confirm that at least 5 different Environments were used to create retrofit 201 (measure 116): HG751DEV for development and unit testing, HR751REP for replication and unit testing, and HG75105C, HR70205C, and HR75105C for unit testing. Two Environments, HG751DEV and HR751DAT, were used to create DAT files (measure 115). In total, 6 distinct Environments were used to create retrofit 201 (measure 117).

d) 100% of First Deliverables Were Contaminated

345. None of the 16 recipient customers was known to be the source of the Install Media used to create any of the Environments used to create retrofit 201. 16 of 16 customers therefore received First Deliverables Contaminated by Cross-Use (measure 123), and the

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[167] For retrofit 201, Mandiant found some customer-labeled documentation on Delivered Updates and Fixes that contained the string "2005C-751G" and had an earlier last modification date than did the compressed file containing the Objects delivered to the customers. Mandiant's protocol dictated that some of the contents of these compressed files be removed from analysis, because they postdated the documentation. This step in Mandiant's protocol resulted in the discard of several File-based Objects for certain Fixes, as discussed in Appendix K.

[168] Retrofit 201 contained several files that were identical to files that had previously been sent out as individual Fixes. Customers who received a file from an individual Fix identical to a file contained in retrofit 201 were also deemed to have received retrofit 201.

15 of 16 customers that received DAT files received First Deliverables Contaminated by DAT Contamination (measure 122).

346.   Review of the files on Delivered Updates and Fixes reveals that 14 of the 16 customers received identical Associated Files, resulting in Hash Contamination (measure 125).

347.   To summarize, looking only at Delivered Updates and Fixes, 100% of the recipient customers that received a First Deliverable found on Delivered Updates and Fixes received a Contaminated First Deliverable due to either DAT Contamination or Hash Contamination (measure 130). Accounting for Cross-Use Contamination, again, 100% of recipient customers (measure 131) received a Contaminated First Deliverable.

C.   THE FIXES CONTAIN SUBSTANTIAL PORTIONS OF ORACLE'S REGISTERED WORKS

348.   Mandiant compared the File-based Objects SAP TN delivered to the File-based Objects found in the PeopleSoft Enterprise Application Software that embodies Oracle's Registered Works.[169]   Mandiant performed this comparison to determine what percentage of the File-based Objects in Fixes came directly from Oracle code.

1.   Almost Every File-based Object in Fixes with a Matching File Names Reproduces a Substantial Portion of Oracle Code

349.   Of the 6447 unique hashes for File-based Objects in Fixes, 5475 occurred in filenames that exactly match the filename of a File-based Object found in a Registered Work. With respect to those 5475 files, at least 40% or more of the contents of a File-based Object found in the Registered Works was reproduced in 98.2% of the unique File-based Objects delivered to customers by SAP TN.   62.8% of the unique File-based Objects with matching file names contained 90% or more of the exact contents of a File-based Object found in the Registered Works.

350.   When the 972 File-based Objects without a matching file name in the Registered Works are taken into account, at least 40% or more of the contents of a File-based Object found in the Registered Works was exactly reproduced in 83.4% of the unique File-based Objects delivered to customers by SAP TN.   53.3% of the unique File-based Objects delivered to customers by SAP TN contained 90% or more of the exact contents of a File-based Object found in the Registered Works.

351.   The chart below summarizes Mandiant's analysis of the content similarity between SAP TN's delivered Filed-based Fix Objects and Oracle's Registered Works. It shows that the vast majority of SAP TN's delivered File-based Objects contain more than 80% of Oracle's originally-developed code.

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[169] Mandiant was provided with a set of Install Media for Oracle Enterprise Application Software and was instructed to assume that all materials present on or installed by these Install Media are part of the Registered Works.
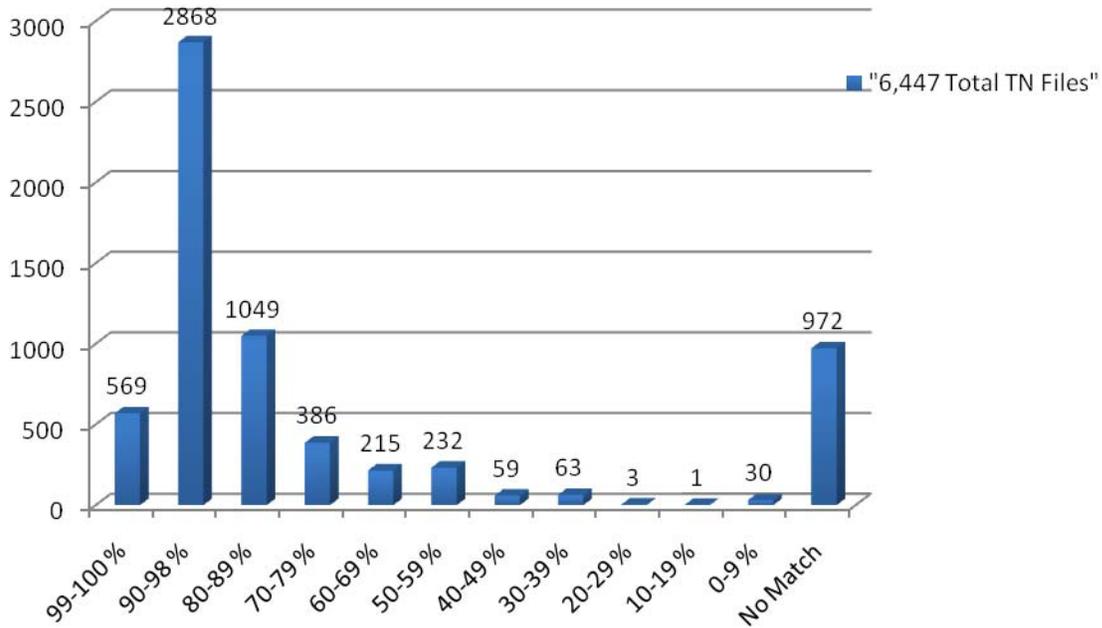
Figure 18: Percentage of Original Oracle Registered Works Contained within the SAP TN Delivered Updates and Fixes (histogram)

352.   The chart below presents the information above in a different way, again showing most File-based Fix Objects delivered by SAP TN contained more than 80% of the exact same code as Oracle's Registered Works.
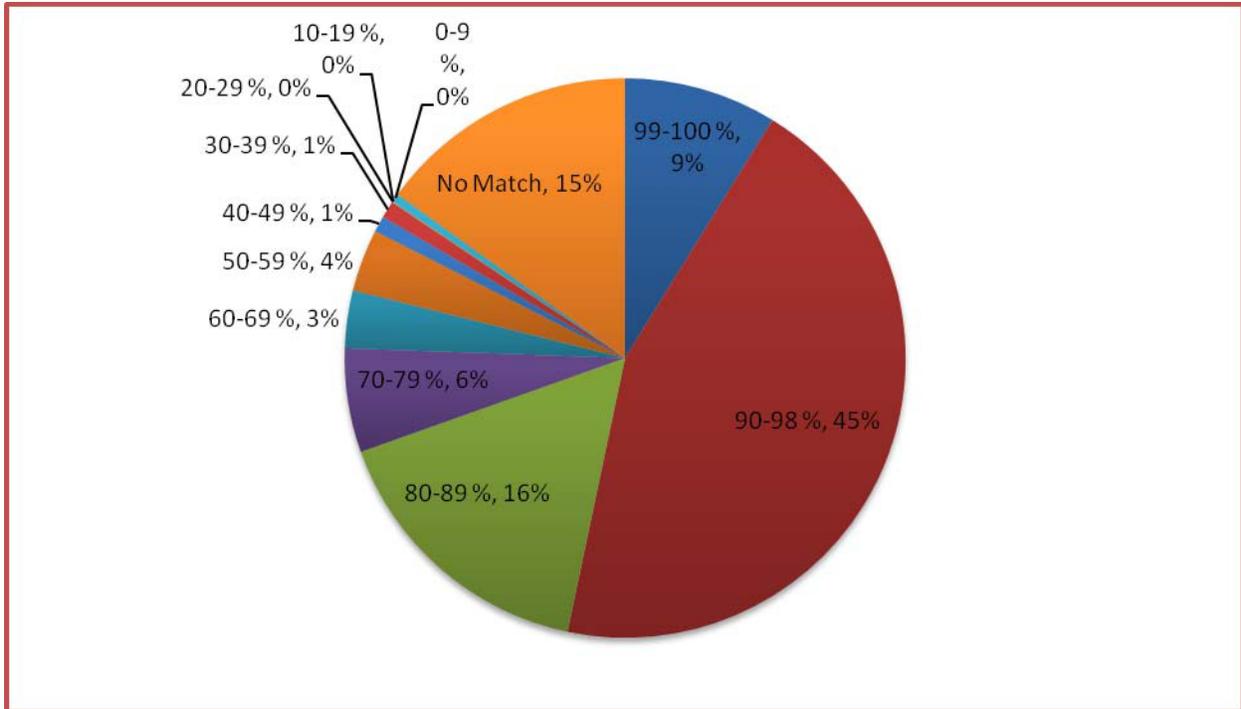
Figure 19: Percentage of Original Oracle Registered Works Contained Within the SAP TN Delivered Updates and Fixes (pie chart)

353. Based on our comparison of Oracle Registered Works to SAP TN's Delivered Updates and Fixes, Mandiant concludes that SAP TN copied and modified the File-based Objects in Oracle's Registered Works. The substantial overlap between the two sets of File-based Objects demonstrates that Fixes were dependent upon the File-based Objects found in Oracle's Registered Works. A detailed discussion of this analysis can be found in Appendix G.

2. Almost Every File-based Object in Fixes with No Matching File Name in the Oracle Registered Works Is Derived from a Downloaded Oracle File

354. With respect to the 972 File-based Objects in Fixes where there was no file name match to a File-based Object in the Registered Works, Mandiant examined SAP TN's downloads of PeopleSoft SSMs from Customer Connection.

355. Oracle downloads with File-based Objects with matching names were found for 868 of the 972. Where a match was found, 99.7% of the File-based Objects in Fixes contained 40% or more of the exact contents of a File-based Object found in an Oracle download, and 76.3% of the File-based Objects in Fixes contained 90% or more of the exact contents of a File-based Object found in an Oracle download.

356. Taking into account the 104 File-based Objects in Fixes with no match in the Oracle downloads, 89.0% of the File-based Objects in Fixes contained 40% or more of the exact contents of a File-based Object found in an Oracle download, and 68.2% of the File-based Objects in Fixes contained 90% or more of the exact contents of a File-based Object found in an Oracle download.

357.	The chart below summarizes Mandiant's analysis of the content similarity between Oracle's Registered Works and SAP TN's delivered Filed-based Fix Objects that did not match a Registered Work by file name. Similar to the Registered Work compare, the vast majority of SAP TN's delivered File-based Objects contain more than 80% of Oracle's originally-developed code.
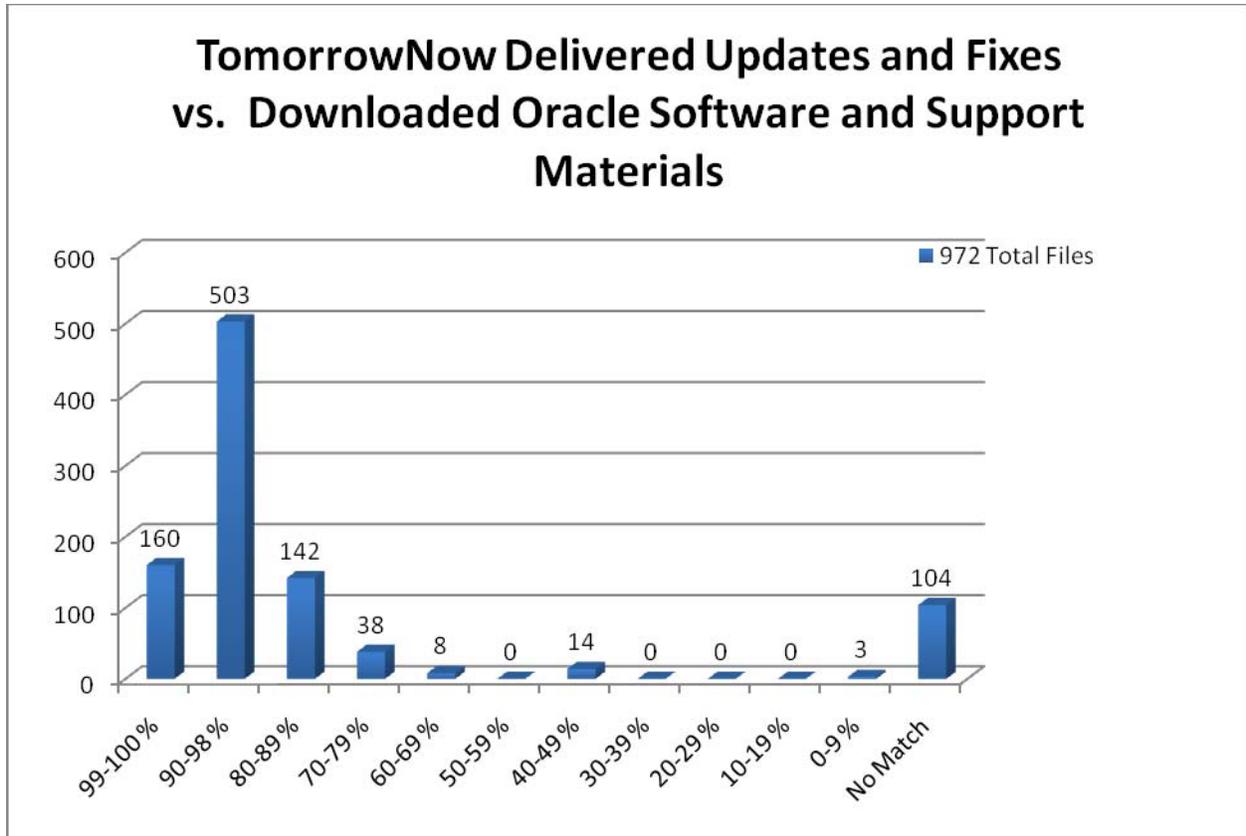
Figure 20: Percentage of Original Oracle Registered Works Contained Within the SAP TN Downloaded Software and Support Materials (histogram)

358.	The chart below presents the information above in a different way, again showing most File-based Fix Objects delivered by SAP TN that did not match a Registered Work by filename contained more than 80% of the exact same code as Oracle's SSMs.
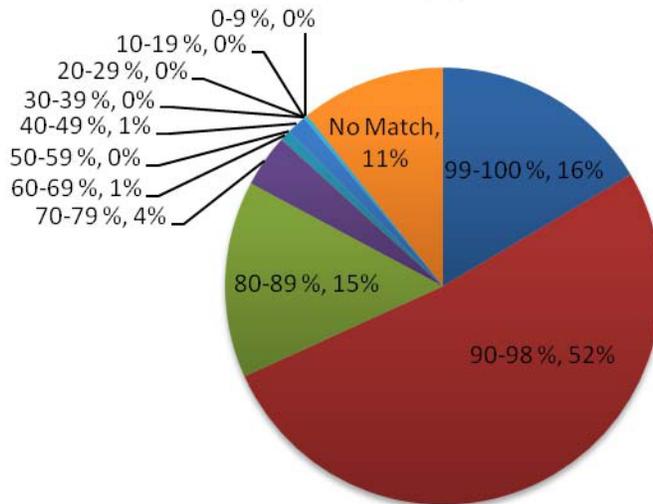
Figure 21: Percentage of Original Oracle Registered Works Contained Within the SAP TN Downloaded Software and Support Materials (pie chart)

359.   It is my opinion that the substantial overlap between the File-based Objects in Fixes with no matching file name in the Registered Works and the File-based Objects in the materials SAP TN downloaded from Oracle demonstrates that SAP TN copied SSMs downloaded from Oracle in generating the Fixes. It is also my opinion that the substantial overlap between the two sets of File-based Objects demonstrates that Fixes were dependent upon the File-based Objects found in material downloaded from Oracle. It is also my opinion that the substantial overlap between the two sets of File-based Objects demonstrates that Fixes were created by reproducing and modifying Oracle code. A detailed discussion of this analysis can be found in Appendix G.

3.   98% or More of the File-based Objects Fixes Contain Oracle's Copyright and Confidentiality Statements

360.   Mandiant also examined the File-based Objects in Fixes for additional evidence that these files were copied from Oracle code. Mandiant found that 98.4% of SAP TN's File-based Objects within Delivered Updates and Fixes contained Oracle's copyright statement, and 98% contained Oracle's confidentiality statement. It is also clear that SAP TN employees were aware of and reviewed these statements, both from SAP TN employee testimony and because SAP TN regularly modified or added to these statements.[170] A detailed discussion of this analysis can be found in Appendix G.

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[170] *See, e.g.,* Deposition of Sharon Piper, June 25, 2008 at 7:11-9:22; Plaintiffs' Deposition Exhibit 304.

D. JD EDWARDS YEAR END FIXES

361. For JD Edwards World, SAS documents only four Fixes as being delivered to multiple customers: 0124061519, 1012062843, 1012063101, and 1012063592. The table below provides information about these fixes from SAS.

Fix ID	Description	Customer
0124061519	2005 1099 Year End Processing	Koontz-Wagner
		Lexmark International
1012062843	2006 - A7.3 1099 Year End Updates/Changes	Apria Healthcare Group, Inc.
		Captain D's LLC
		CC Industries, Inc.
		Coty Inc.
		Education Direct, Inc
		Electrolux IT Solutions AB
		Eriez Manufacturing Co
		Flint Group Incorporated
		Helzberg Diamond Shops, Inc.
		Hubbard Construction Company
		Koontz-Wagner
		Lexmark International
		Lincoln Property Company
		Littleton Public Schools
		Metro Machine Corporation
		New Creative Enterprises (previously known as Decorative Concepts, Inc.)
		Solar Sources, Inc.
		SPX Flow Technology
		Texas Association of School Boards, Inc.
		Veka Inc.
1012063101	A7.3 2006 - W2 Year End Updates/Changes	Atlantic Marine, Inc
		Basler Electric Company
		Electrolux IT Solutions AB
		Eriez Manufacturing Co
		Helzberg Diamond Shops, Inc.
		Hubbard Construction Company
		Just Born, Inc.
		Koontz-Wagner
		Littleton Public Schools
		Metro Machine Corporation
		Solar Sources, Inc.
		WorldTex, Inc.
1012063592	2006 - A8.1 1099 Year End Updates/Changes	Laird Plastics
		Lincoln Property Company

Table 34: Customer Recipients for Four JD Edwards SAS Master Fixes

362. Each of these Fixes, described as a year-end update, implements legislative and regulatory changes necessary for ongoing use of World's Financials or Human Resources functionality.

363. Mandiant's inspection and subsequent review of SAP TN's AS/400 revealed a number of customer code libraries apparently related to year-end Fixes, many of which contained a reference to Fix ID 1012062843. Based on Mandiant's analysis, these customer code libraries were used in the implementation of Fix 1012062843, described in SAS as "2006 - A7.3 1099 Year End Updates/Changes."

364. Mandiant performed a detailed review of source code objects and their members from 13 libraries apparently relating to this Fix to determine what code changes had occurred in late 2006 & early 2007.

365. Mandiant performed a forensic analysis of these code libraries to investigate SAP TN's development process. Mandiant first determined that the library for Koontz Wagner,

KNW2006, had been changed almost three months earlier than any of the other libraries, had been changed more frequently than the other libraries (37 change dates in on or after 8/12/2006, compared to a maximum of 5 change dates for the other libraries), and over a longer period of time than the other libraries (four months of changes, compared to a maximum of 13 days for the other libraries). Mandiant therefore used KNW2006 as a basis of comparison to investigate the other libraries.

366.   Mandiant was able to compare the 26 members in the KNW2006/JDESRC Object to 88 corresponding members in the other 13 Objects. When comparing the JD Edwards source code contained in the 26 members of the KNW2006/JDESRC Object to the 88 corresponding members in the 13 Objects:

- 27 members out of 88 (30.6%) contained changes that were identical to the changes made in the KNW2006/JDESRC library.
- 49 members out of 88 (55.6%) contained functionally identical code, with the differences almost solely in the comments field.
- 11 members out of the 88 members (12.5%) were never changed in 2006.
- 1 member out of 88 contained different code.

367.   Based on the similarities between KNW2006 and the other code libraries, and based on an edit period that both preceded and was eight times longer than the other edit periods, it is my opinion that SAP TN developed its changes in KNW2006 and then copied them out to the other code libraries in the sample.

368.   It is also my opinion that each of these code libraries contains a copy of a substantial portion of Oracle code from JD Edwards World A7.3.

369.   A more detailed analysis can be found in Appendix L.

IX. CONCLUSION 4: SAP TN CONTINUED TO ACCESS, DOWNLOAD, COPY, MODIFY, AND DISTRIBUTE ORACLE ENTERPRISE APPLICATION SOFTWARE AND SSMs AFTER ORACLE FILED THIS ACTION

370.   I conclude that SAP TN continued to generate and distribute Fixes that were Contaminated after Oracle filed suit on March 22, 2007. A review of the Delivered Updates and Fixes revealed SAP TN delivered a minimum of 4607 total zip files in the form of Bundles.[171] Approximately 1,921 of these Bundles were last recorded on SAP TN systems after March 22, 2007. Mandiant considered these Bundles delivered after the Oracle filing. Therefore, approximately 42% of these Bundles were delivered after the Oracle suit. Of the Fixes delivered after March 22, 2007, Mandiant's analysis revealed extensive Contamination.   For instance, Mandiant determined that 100% of the customers that received the critical 1099 Fix, discussed above and developed in late 2007, received a Contaminated Fix. SAP TN continued to use Generic Environments to generate DAT Files after March 22, 2007.

371.   SAP TN continued to copy Environments at least through the backup and restore process after March 22, 2007. PSDEV02, produced on December 1, 2009, contains backup Environments created as late as April 22, 2008.   Looking across all backup Environments, 563 (17.5% of 3,222 backups) were created after March 22, 2007 (See ORCLX-MAN-000343).

372.   SAP TN continued to use its instances of Oracle Database after March 22, 2007, and SAP TN continued to use them to provide support services.[172] SAP TN employee John Baugh stated that Oracle Database was used to support SAP TN customers through October 2008.[173]

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[171] *See* ORCLX-MAN-000387.

[172] *See, e.g.*, Defendants' Responses and Objections to Plaintiffs' Fourth Set of Requests for Admission, RFAs 3 and 4.

[173] *See* Deposition of John Baugh, December 3, 2009, at 189:11-190:5

X.   SUMMARY: SAP TN COPIED, DOWNLOADED, MODIFIED, DISTRIBUTED, AND USED A SIGNIFICANT AMOUNT OF MATERIAL PROTECTED BY THE COPYRIGHTS ORACLE ASSERTS IN THIS ACTION

373.   SAP TN created thousands of Environments, Environment backups, and copies of Install Media. Based on information received from Mr. Screven and Mr. Lichtman, and based on my own experience relating to software development, each SAP TN Environment or installation of Oracle Database described in the table below is a copy of software that contains substantial amounts of protectable expression from Oracle's Registered Works.

Product Family	Product Name(s)	Abbreviation(s)	Versions
PeopleSoft	Customer Relationship Management	CRM	8.0 and up
PeopleSoft	Enterprise Performance Management	EPM	All versions
PeopleSoft	Financials; Supply Chain Management; Financials, Distribution and Manufacturing; Financials and Supply Chain Management	FIN, FDM, SCM, FDM, FSCM	7.0 and up
PeopleSoft	Human Resources Management Software	HRMS	7.0 and up
PeopleSoft	Student Administration, Campus Solutions	SA	All versions
PeopleSoft	PeopleTools	PT	All versions
JD Edwards	World	W	All versions
JD Edwards	EnterpriseOne, OneWorld	E1, OW	All versions
Siebel	All products		All versions
Oracle Database	All products		All versions

Table 35: Oracle Enterprise Application Software and Oracle Database Software Protected by Oracle's Copyright Registrations in the Fourth Amended Complaint

374.   Mandiant compared SAP TN's Environments, installations of the Oracle Database, and backups to Oracle Enterprise Application Software and Oracle Database Software through: (1) review of file name and path; (2) review of directory structure and inspection or comparison of code; and, (3) comparison of file MD5 Hashes. See Section VII.

375.   Mandiant has reviewed downloads from Oracle's support websites by SAP TN, providing independent evidence that SAP TN's backups and Environments were created from Oracle Enterprise Application Software and Oracle Database Software. Mandiant has also reviewed the results of the CD Binder index project, containing hundreds of copies of Install Media received from SAP TN customers.

376.   SAP TN downloaded millions of SSMs from Customer Connection. Based on information received from Mr. Screven and Mr. Lichtman, and based on my own experience relating to software development, each copy of an SSM described in the table below embodies a portion of one of Oracle's Registered Works.

Product Family	Product	Scope
JD Edwards	EnterpriseOne	All SARs, ESUs and cumulative updates
JD Edwards	World	All SARs, code changes and cumulative updates
PeopleSoft	All	All service packs, maintenance packs, updates, fixes and patches
Siebel	All	Siebel fixes and fix packs
Oracle Database	All	All updates, patches and fixes
JD Edwards	Automated Database	Microsoft Office documents, .htm, .html, .log, .pdf, .txt, .xml and compressed files
PeopleSoft	Automated Database	Microsoft Office documents, .htm, .html, .log, .pdf, .txt, .xml and compressed files
Siebel	Automated Database	Microsoft Office documents, .htm, .html, .log, .pdf, .txt, .xml and compressed files
PeopleSoft	PeopleTools	All updates, patches, and fixes

Table 36: Additional Software and Support Materials Protected by Oracle's Copyright Registrations in the Fourth Amended Complaint

377.   Mandiant compared these materials to Oracle Enterprise Application Software and Oracle Database Software in various ways, including (1) review of file name; (2) inspection or comparison of code and file contents; and (3) comparison of MD5 Hash. See Section VI. Mandiant has also compared these materials to Fixes delivered by SAP TN to its customers, again through review of file name and path, inspection or comparison of code and file contents, and comparison of MD5 Hash. See Appendix G.

378.   SAP TN created thousands of Fixes in order to modify or add new features or functionality to Oracle Enterprise Application Software. Mandiant has compared these Fixes to Oracle Enterprise Application Software and SSMs in various ways, including (1) review of file name and path; (2) inspection or comparison of code and file contents; and (3) comparison of MD5 Hash. See Appendix G. Mandiant has also reviewed documentation of SAP TN's Fix-delivery process, including SAS and other sources of documentation, and has observed that the stated purpose of SAP TN's Fixes was primarily to modify existing features or functionality or add new features or functionality to Oracle Enterprise Application Software. See Section V.

Report Submitted By:

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November 16, 2009

Supplemental Report Submitted By:

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February 12, 2010

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