P6 File Corruption,

Part 2

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Introduction

As enterprise scheduling programs such as Oracle® Primavera P6℠ grow into massive database systems, the problem of database corruption becomes increasingly more relevant to software users. Over time, when features multiply and modifications are made to improve response time, it is inevitable that subtle errors creep into the database by overworked data systems.

Many of the software features use tokens in the database to represent one of many possible settings. The database itself does not oversee the process to ensure that only valid tokens are used. The busy software developer may be too harried in producing the latest schedule feature to invest time in ensuring that only valid tokens are used. This is partly due to the fact that checking for valid tokens would additionally require the development of some sort of process to report and correct the errors, in addition to creating the new feature that they were charged with creating in the first place.

In general, the best that a software developer can do to deal with the issue of possible database corruption is to make sure that if a correct setting is not found, then a default one is used. Without reporting on the database corruption, these errors are bound to multiply, and untraceable errors, based on assuming an incorrect default setting, creep into the critical path method (CPM) scheduling process. This condition especially worries forensic claims experts, where entire claim findings may hinge on this lack of visibility and accuracy.

Earlier versions of P6 software have a feature called "Check Project Integrity". This utility performs two types of integrity checks: Data Join and Data Value. Data Join examines the P6 database to confirm that records in one table referencing records in another table actually exist in the database. Data Value inspects open projects for valid settings in certain fields. While incomplete in its analysis and usually unable to do anything about the corruption when found, this process at least marks a beginning toward rational enterprise database management. The Check Project Integrity utility has been removed from P6 r8.0.

In addition to incorrect entries, not all data fields are required to be filled-in. In database parlance this means that some fields may optionally be "Null." One such example is the activity relationship table which considers the relationship duration (often called, "lag") as an optional field. In other words, a lag may be legally positive, zero, or negative, but it should not be just missing.

Why should errors in the P6 database be noted? Once the correct setting is known, the fix is straight-forward using P6. The user only has to open the schedule, find the blank entry and replace it with the correct one. Knowing where to look to find these corruptions is the key to repairing corrupt databases.

P6 File Corruption, Part 1 explains what database corruption is, and when it sometimes is mistakenly suspected. P6 File Corruption, Part 2 proactively explains how the user might identify P6 database corruption issues and how to fix them. The paper concludes with the results of an extensive survey of P6 users to identify how prevalent database corruption is and what types are most likely.

Check Project Integrity Utility

Primavera P6 Version 6.6 provides built-in integrity checks. These checks have been modified in P6 r7.0, and then removed entirely starting with r8.0.

There are two types of integrity checks that can be made: do the various tables point to existing records in the other tables (Data Join Integrity Check), and are the individual settings logically allowable (Data Value Integrity Check).

Data Join Integrity Check

P6 users of r8.0 and later must run the published scripts manually. P6 users may also include data join checks in a database maintenance plan (SQL) or scheduled job (Oracle) [1].
The list below tells the general nature of the items checked. Very few items can be corrected by P6 directly because the correct setting is not obvious. However, as a courtesy, Oracle provides P6 users with detailed SQL statements which help to identify and fix orphan records [2].

1.   Check Activity for: Project mismatch between Activities and WBS.
2.   Check Activity Resource Assignment for: Project mismatch between Activity Resource Assignments and Activities.
3.   Check Timesheet Hour for: Project mismatch between Timesheet Hours and Activity Resource Assignments.
4.   Check Timesheet Hour for: Resource mismatch between Timesheet Hours and Activity Resource Assignments.
5.   Check Document Assignment for: WBS mismatch between Document Assignments and Activities.
6.   Check Document Assignment for: Project mismatch between Document Assignments and WBS.
7.   Check Project Expense for: Project mismatch between Project Expenses and Activities.
8.   Check Activity Code Assignment for: Project mismatch between Activity Code Assignments and Activities.
9.   Check Activity Notebook for: Project mismatch between Activity Notebook and Activities.
10.   Check Activity Step for: Project mismatch between Activity Steps and Activities.
11.   Check Activity Feedback for: Project mismatch between Activity Feedback and Activities.
12.   Check Activity Note to Resources for: Project mismatch between Activity Notes to Resources and Activities.
13.   Check Activity Relationship for: Project mismatch between Activity Relationships and Activities.
14.   Check Activity Relationship for: Project mismatch between Successors and Activities.
15.   Check Activity for: Project mismatch between Calendars and Activities.

16. Check Activity Code Assignment for: Project mismatch between Activity Code Assignments and Activity Codes.
17. Check Document Assignment for: Project mismatch between Document Assignments and Work Products and Documents.
18. Check Project for: Project mismatch between Projects and WBS.
19. Check Activity Relationship for: Activity Relationship mismatch between Successor and Activities.
20. Check Activity Relationship for: Activity Relationship mismatch between Predecessor and Activities.
21. Check WBS for: WBS Parent mismatch between WBS and WBS. This error can occur when one moves a schedule with attached Baseline Schedules from one WBS to another and the WBS of the Baseline Schedule remains unchanged.

Data Value Integrity Check

Data Value Integrity Check investigates project-specific records to ensure that the proper values have been assigned. Oracle does not provide SQL scripts for Data Value Integrity Checks, which significantly complicates troubleshooting corruption instances for P6 users of r8.0 and later.

 The list of Data Value Integrity Checks includes the following:

1 Check Project for: Planned Start Date = Null
2. Check Project for: Planned Start Date > Must Finish By Date
3. Check Project for: Data Date < Planned Start Date
4. Check Project for: Planned Start Date > earliest activity Actual Start Date
5. Check Project for: Planned Start Date > Scheduled Finish Date
6. Check Activity for: Planned Start Date = Null
7. Check Activity for: Planned Finish Date = Null
8. Check Activity Resource Assignment for: Assignment with no resource specified
9. Check Activity Resource Assignment for: Completed assignment Actual Units = 0
10. Check Activity Resource Assignment for: Assignment with no cost account
11. Check Activity Resource Assignment for: Assignment with Remain Units/Time = 0
12. Check Activity Resource Assignment for: Assignment with Price/Time = 0
13. Check Activity Resource Assignment for: Assignment with resource Price/Time or Overtime Factor out of sync
14. Check Activity Resource Assignment for: Resource assignment Labor flag out of sync
15. Check Activity Resource Assignment for: Planned Start Date = Null
16. Check Activity Resource Assignment for: Planned Finish Date = Null
17. Check Activity Resource Assignment for: Not Started assignment Actual Units > 0
18. Check Activity Resource Assignment for: Completed assignment Remaining Units > 0
19. Check Activity Resource Assignment for: Not Started assignment Actual Start Date <> Null
20. Check Activity Resource Assignment for: Not Started assignment Actual Finish Date <> Null
21. Check Activity Resource Assignment for: Not Started assignment Remaining Start Date = Null
22. Check Activity Resource Assignment for: Not Started assignment Remaining Finish Date = Null
23. Check Activity Resource Assignment for: In Progress assignment Remaining Start Date = Null
24. Check Activity Resource Assignment for: In Progress assignment Remaining Finish Date = Null
25. Check Activity Resource Assignment for: Completed assignment Actual Start Date = Null

26.   Check Activity Resource Assignment for: Completed assignment Actual Finish Date = Null
27.   Check Activity Resource Assignment for: Completed assignment Remaining Start Date <> Null
28.   Check Activity Resource Assignment for: Completed assignment Remaining Finish Date <> Null
29.   Check Activity Resource Assignment for: Planned Finish Date < Planned Start Date
30.   Check Activity Resource Assignment for: Actual Finish Date < Actual Start Date
31.   Check Activity Resource Assignment for: Remaining Finish Date < Remaining Start Date
32   Check Activity for: Planned Start Date < Project Planned Start Date
33.   Check Activity for: Planned Finish Date < Project Planned Start Date
34.   Check Activity for: Activity does not have primary resource
35.   Check Activity for: Primary resource is a non-labor resource
36.   Check Activity for: Activity does not have predecessor
37.   Check Activity for: Activity does not have successor
38.   Check Activity for: Completed activity Actual Units = 0
39.   Check Activity for: Actual Start Date > Data Date.
40.   Check Activity for: Fixed Units or Fixed UPT activity has negative planned or remaining values.
41.   Check Activity for: Milestone has actuals
42.   Check Activity for: Activity has primary resource but has no assignments
43.   Check Activity for: Milestone has Resource Assignment(s)
44.   Check Activity for: Data inconsistent with Milestone activity type
45.   Check Activity for: Not Started activity Actual Units > 0
46.   Check Activity for: Completed activity Remaining Units > 0
47.   Check Activity for: Not Started activity Actual Start Date <> Null
48.   Check Activity for: Not Started activity Actual Finish Date <> Null
49.   Check Activity for: Not Started activity Remaining Start Date = Null
50.   Check Activity for: Not Started activity Remaining Finish Date = Null
51.   Check Activity for: Not Started activity is for review to finish
52.   Check Activity for: In Progress activity Remaining Start Date = Null
53.   Check Activity for: In Progress activity Remaining Finish Date = Null
54.   Check Activity for: Completed activity Actual Start Date = Null
55.   Check Activity for: Completed activity Actual Finish Date = Null
56.   Check Activity for: Completed activity Remaining Start Date <> Null
57.   Check Activity for: Completed activity Remaining Finish Date <> Null
58.   Check Activity for: Review activity has missing Review Finish Date
59.   Check Activity for: Planned Finish Date < Planned Start Date
60.   Check Activity for: Actual Finish Date < Actual Start Date
61.   Check Activity for: Remaining Finish Date < Remaining Start Date
62.   Check Project Expense for: Expense with no cost account

Warnings (False Positives) of Data Value Integrity Checks

Some of the items on the detailed list of Data Value Integrity Checks are identified for informational purposes only and do not affect the operation of P6. For releases prior to r8.0, where the utility is still part of the client application, these items are reported as a 'Warning' on the Check Data Integrity log file with the following note: 'Please examine and correct the data manually'. The example below illustrates this warning for Data Value Integrity Check, #9.

Figure 1 – 'Warning' example on Check Data Integrity log file

There are nineteen out of sixty-two Data Value Integrity Checks that report on esoteric conditions, designated as 'warnings' in the log file, which must be manually fixed by the user: checks 3, 4, 5, 8, 9, 10, 11, 12, 13, 32, 33, 34, 35, 36, 37, 38, 39, 40, and 62 [3].

Several checks from the above group look for conditions that are, in some cases, manually created using the P6 software without any issue of database corruption being evident. This is called a false positive and should be ignored. It would be better if they were not run at all.

The following Data Value Integrity Checks are unneeded and should be eliminated from the published list:

9.   Check Activity Resource Assignment for: Completed assignment Actual Units = 0
10.   Check Activity Resource Assignment for: Assignment with no cost account
11.   Check Activity Resource Assignment for: Assignment with Remain Units/Time = 0
12.   Check Activity Resource Assignment for: Assignment with Price/Time = 0
13.   Check Activity Resource Assignment for: Assignment with resource Price/Time or Overtime Factor out of sync
34.   Check Activity for: Activity does not have primary resource
36.   Check Activity for: Activity does not have predecessor
37.   Check Activity for: Activity does not have successor
38.   Check Activity for: Completed activity Actual Units = 0
39.   Check Activity for: Actual Start Date > Data Date.
51.   Check Activity for: Not Started activity is for review to finish

Errors of Data Value Integrity Checks

A considerable number of Data Value Integrity Checks identify issues caused by business rule violations of how activity data is stored in the database. For releases prior to r8.0, where the utility is still part of the client application, these items are reported as an 'Error' on the Check Data Integrity log file. If the user runs the utility without using the 'automatically fix correctable errors' option, the recommendation on how to set the missing data is added. The example below illustrates an error for Data Value Integrity Check, #26.

Figure 2 – 'Error' example on Check Data Integrity log file

Seventy percent of Data Value Integrity Checks report on database corruptions, designated as 'errors' in the log file, and can be automatically fixed by the Check Project Integrity utility in P6 releases prior to r8.0. However, since this utility is no longer in the client application, starting with r8.0, P6 users are presented with a serious challenge of identifying and correcting real cases of database corruption manually without any readily available resources.

Unidentified (and, consequently, not fixed) database corruptions can manifest themselves by significantly hindering P6 features. As an example, Data Value Integrity Check #26, if not caught and corrected in r8.4.2.0 and later, presents Oracle® Primavera EPPM℠ users of the Team Member module with the following error: 'An Error Has Occurred. Please Contact Your System Administrator' [4]. This error is generated when users try to add activities using the option 'Automatically add current tasks to timesheet'.

Manually crafting, testing and executing custom database queries and scripts to correct the above corruption is an intense effort, which requires technical skills from P6 users. The following procedure outlines steps on how to manually fix Data Value Integrity Check, #26.

First, all instances of this corruption must be identified. This is accomplished using a SQL query which finds and lists all completed activities with resource assignments that are missing Actual Finish dates. (Note: the following SQL statements were formatted to improve reader comprehension. It could have just as correctly have been written in one line without starting new lines and without any capitalization of reserved words.)

```
SELECT      project.proj_short_name,
            task.task_code,
            rsrc.rsrc_short_name,
            rsrc.rsrc_name
FROM        project
JOIN        task ON project.proj_id = task.proj_id
JOIN        taskrsrc ON task.task_id = taskrsrc.task_id
JOIN        rsrc ON taskrsrc.rsrc_id = rsrc.rsrc_id
WHERE       task.act_end_date IS NOT NULL AND
            taskrsrc.act_end_date IS NULL AND
            orig_proj_id IS NULL AND
            taskrsrc.delete_session_id IS NULL
ORDER BY    project.proj_short_name,
            task.task_code
```

Next, the user decides whether to set Actual Finish dates for the Resource Assignments to the activity's Actual Finish or Planned Finish dates. This can be determined on a project-by-project, activity-by-activity, or even resource-by-resource basis. Once the decision is made, custom scripts must be tested and executed to fix the corruption. An example of one such script sets all identified instances of missing Actual Finish dates of the Resource Assignments for completed activities to the activity's Actual Finish date:

```
UPDATE      taskrsrc
SET         taskrsrc.act_end_date = task.act_end_date
FROM        project
JOIN        task ON project.proj_id = task.proj_id
JOIN        taskrsrc ON task.task_id = taskrsrc.task_id
JOIN        rsrc ON taskrsrc.rsrc_id = rsrc.rsrc_id
WHERE       task.act_end_date IS NOT NULL AND
            taskrsrc.act_end_date IS NULL AND
            orig_proj_id IS NULL AND
            taskrsrc.delete_session_id IS NULL
```

Purging the POBS Table

As detailed in Part 1 of this paper, the Public Operational Breakdown Structure (POBS) Table should exist in the P6 database, but it should also be empty. Otherwise, thousands of useless records are imported and exported via XER file transfers, causing the POBS table to grow ever-larger.

Fortunately, this problem has been addressed for versions of P6 including r8.3.12.0, r8.4.8.0, r15.1.5.0, r15.2.1.0, r16.1.0 and all later releases. The solution involves not incorporating any POBS records found in the XER imports into the database and not transmitting them in XER exports. Earlier versions of P6 still have the vulnerability of receiving and transmitting these useless POBS records.

The Oracle® Primavera P6℠ technical solution, detailed in this paper, prevents further spread of the POBS data; however, it does not address the condition of the useless bulk of records still in the POBS table. For P6 stand-alone users, who have to work with the limited 4 GB database size limits, this oversight can become a problem.

Oracle® POBS Solution

The following solution for purging the POBS table is for Oracle database servers only [5]. From the Microsoft® Windows Start button, select All Programs / Oracle Database 10g Express Edition / Go To Database Home Page. Enter the administrative Username (ADMPRM$PM, or sometimes ADMUSER) and the database password, and click the Login button.

Click the SQL button, then click the New SQL button. In the edit box, located on the right, enter the two lines shown below and click the Run button.

```
DELETE FROM pobs;
COMMIT;
```

Replace the commands entered with the following command, and click the Run button.

ALTER TRIGER rt_pobs DISABLE;

Edit the previous command entered to match the following command, and click the Run button.

ALTER TRIGGER rt_pobs_del DISABLE;

Finally, click the Logout link in the upper-right part of the screen. The POBS table has been purged of all of the useless records. After Oracle® performs housekeeping, the database recovers all of the regained space.

Microsoft® SQL® POBS Solution

The following solution for purging the POBS table is for Microsoft® SQL® database servers only [5]. From the Windows Start button, select All Programs / Microsoft SQL Server xxxx / SQL Server Management Studio.

The first two parameters in the login screen should be populated automatically and not changed by the P6 user. If this is a stand-alone Express edition, the Windows Authentication option (third parameter) can be used, otherwise P6 users need an Administrator's User name and Password.

Expand the Database tab and select the Primavera database. Click the New Query button; the SQL Query page should be displayed.

Enter the following line in the right section:

DELETE FROM pobs;

Now click the Execute button, and after a time, the results should be displayed in the lower box as a count of the number of rows affected.

Finally, exit from the program. (Click 'No' if asked to save the last query).

Other Instances of Corruption

Missing P6 Toolbar

Corruption to the User Data table can lead to peculiar occurrences. One such problem exhibits itself when the user's toolbar is missing and cannot be reset [6]. The solution to this problem is to delete the existing user data preferences so that P6 can automatically recreate the user preferences with the default settings [7].

To delete the P6 user preference settings, log into the database using the administrator's credentials (as described in the earlier examples), and execute the following script:

```
UPDATE        userdata set user_data = NULL
WHERE         topic_name = 'pm_settings'
              AND user_id IN
              (SELECT        user_id
               FROM          users
               WHERE         user_name = '<username>');
```

The place holder of <username> above should be substituted with the P6 user's login name, which is case sensitive. If this is executed on an Oracle database, the following line should also be entered and executed:

```
COMMIT;
```

After this process is complete, the user should login to P6 Project Management, so that the user preferences are automatically recreated with the default settings. The user will now need to rebuild any of the previous settings in order to complete the process.

Global Activity Codes Convert to Project on Import

When a user imports activity codes within an XER, the P6 application should check if the code type already exists, and create a new one if it does not. Global activity code types do not have a project designation (the field is NULL, or blank). The error occurs when global activity codes are imported as project activity codes [8]. In these cases, it is 'illegal' to have "NULL" as the Project ID.

When a P6 user attempts to add these codes as columns to layouts or values on reports, they either show up as project activity codes or not at all. Attempting to use these codes invariably leads to event codes and an application exit. This issue gives further weight to using XML formats for import and export, as it is not subject to this error.

How is the Industry Experiencing Database Corruption?

For the purposes of this paper, a formal, industry-wide survey of how Primavera P6 Professional℠ and Primavera EPPM℠ users are experiencing database corruption has been conducted. To this end, the software Schedule Analyzer, has included a module from the eForensic series [9] modified to test and report P6 database corruption. This module has been offered at no cost to anyone willing to participate in the survey.

In addition to executing the twenty-one (21) Data Join Integrity Checks and the sixty-two (62) Data Value Integrity Checks – minus the eleven (11) unhelpful Data Value Integrity Checks listed in 'Warnings (False Positives) of Data Value Integrity Checks' section of this paper – thirty-two (32) additional relevant checks have been added. The added checks that are not in the original Oracle® Primavera P6℠ Check Project Integrity utility include:

From the User Preferences Table:
      1. Approval type
      2. Technique for computing earned-value percent complete
      3. Technique for computing earned-value estimate-to-complete
From the POBS Table:
      4. (any record)
From the Projects Table:
      5. Default percent complete type
      6. Default task type
      7. Critical path type
      8. Default Price Time Units
      9. Risk level
From the Projects place in the Work Breakdown Structure Table:
      10. Status code
From the Project Costs Table
      11. Cost load type
From the Activities Table:
      12. Duplicate Activity IDs in a project
      13. Percent complete type
      14. Status Code
      15. Duration type
      16. Task type
      17. Primary Constraint type
      18. Secondary constraint type
      19. Priority type
      20. Review type
      21. Original Duration
      22. Remaining Duration
      23. Longest Path flag

24. Control updates flag

From the Relationships Table

    25. Predecessor type

    26. Lag

From the Activity Resources Table:

    27. Resource type

    28. Rate type

From the Activity Codes Table:

    29. Global ID mismatch with activity codes

    30. Project ID mismatch with activity codes

From the Calendars Table:

    31. Global ID mismatch with calendars

    32. Project ID mismatch with calendars

The research software produces a text file that contains the schedule-by-schedule results of the checks. However, it hides the name of the projects to obscure the identity of the database owner. The volunteers have been able to review the test document before attaching it to an email to the authors.

A total of fifteen (15) P6 production databases have been evaluated. Knowing that the POBS table corruption is widespread and not particularly damaging to P6 operations, statistics on this type of corruptions are kept separate.

Summary of Results

P6 database corruption appears to be pervasive in the construction industry. Out of the fifteen (15) databases analyzed, only one (1), small standalone database, is found to have no database corruptions. The overall totals are displayed in Table 1 below.

	TOTALS	RATE/15
Database Checked	15	
Type of server	1/14	(O/SQL)
Total Activities	8069747	
Total Corruptions (Inc. POBS)	464247	
Total Corruptions (not POBS)	169227	
Total Schedules	8735	
Total Schedules with Corruptions	3963	45%
Average Number of Corruptions/Project (not POBS)	19	
Median Number of Corruptions/Project (not POBS)	1	
Average Number Activities/Corruption (not POBS)	48	

Table 1 – Overall Corruption Research Totals

Once the results of the research have been understood, it becomes clear that including POBS Table corruptions would skew the results. POBS corruptions do not appear to degrade the

database accuracy or results, which justifies not including them in the overall statistics. In addition, POBS corruptions are independent of projects or activities.

The main conclusion to be drawn from the results is that in this study, 45% of the projects tested have some sort of corruption in their database. While the average number of corruptions is around 19 per project, some projects have a very large number of corruptions, while others have very few. The mean of 1 indicates that, while roughly half of the projects have a database corruption, the normal number is very low.

Every scheduling field containing a value that might have a token for an acceptable value has been investigated. Most of the fields containing optional values, that are not logically optional if CPM logic is considered, are checked. The field integrity between major scheduling tables are also investigated. Only a small number of those checks turn up positive results with database corruptions.

Table 2 lists the types of database errors uncovered during the research by totals in descending order. As mentioned before, the POBS Table errors far outnumber the others; even the frequency is far greater. Approximately one half of the databases observed have had these errors.

CORRUPTION TYPE	TOTALS	RATE/15
POBS Table contains xxxx rows of useless data	295052	53%
Assigned resources but not specified for Project	31397	27%
Primary Resource without assignments	28423	67%
Assigned resources but not specified	24409	33%
Planned Start Date earlier than the Project Start date	24334	67%
Planned Finish Date earlier than the Project Start date	24130	73%
Missing lag value for Relationship	15252	87%
Non-labor resource assigned as the Primary Resource	7038	27%
Project mis-match between task and activity calendar	6138	27%
Missing a cost account	4487	73%
Data Date is earlier than Planned Start Date	847	87%
Planned Start Date earlier than Project Planned Start Date	598	40%
Actual units but has not started	510	13%
Duplicate Activity ID record for Project	200	33%
Remaining Start date and activity is completed	195	27%
Remaining Finish date and activity is completed	165	13%
WBS mis-match between task and documents	153	13%
Milestone with resource assignments	91	13%
Project mis-match between activity code Assignments and code type	80	7%
Project mis-match between task and activity code values for Project	80	7%
Remaining units but is complete	76	27%
Activity resource with Planned Finish date before the Planned Start date	69	13%

Activity resource w/ Remain Finish date before the Remaining Start date	67	13%
Milestone with inconsistent data (task-like durations)	67	47%
Missing a Planned Finish date	67	20%
Project mis-match between task and relationship predecessor	60	7%
Project mis-match between task and relationship successor	60	7%
Unrecognized relationship type for Relationship	57	7%
Missing a Planned Start date	44	13%
Project Calendar is missing an associated Project (orphaned).	21	40%
Activity resource assignment missing its Planned Finish Date	13	7%
Activity resource assignment missing its Planned Start Date	13	7%
In-Progress activity resource missing Remaining Finish date	10	7%
In-Progress activity resource missing Remaining Start date	10	7%
Remaining Finish date and activity is completed	8	7%
Activity secondary constraint types	7	13%
Missing Remaining Finish date and activity is in-progress	7	7%
Remaining Start date and activity is in-progress	7	7%
Missing Actual Finish date and activity is completed	3	7%
Planned Start Date is later than Schedule Finish Date	1	7%
Remaining Finish date is earlier than Remaining Start date	1	7%

Table 2 – Types of Database Errors

Task resources account for the majority of the top causes for errors. Impossible or missing Planned Start and Finish dates are the next, most frequently seen, followed by missing relationship lag values.

Several statistics stand out from the above table. Eighty-seven percent of the databases have missing relationship lags – the Critical Path computation cannot be made without knowing the value of a relationship lag. One third of the databases have duplicate activity IDs in the same project. With all of the illogical Data Date errors, it is clear that many projects do not have correctly computed CPM dates.

Conclusion

P6 database corruptions appear to be an industry-wide problem. There are many tools available to detect and repair P6 database corruption issues. Some of these tools, such as the Check Project Integrity utility or custom scripts, are not ideal, but can be utilized to identify and fix corruptions. This paper describes these tools and how to use them properly.

Even though Oracle® Primavera P6℠ provides fixes to manage the POBS corruption issue, the corrupt records remain in most P6 databases. The purge process described in this paper should be executed to clear out the vestiges of this problem.

Other types of observed P6 database corruption issues, such as missing toolbars, can be corrected using SQL commands. Others, such as importing errors, must be understood at the source and prevented whenever possible.

An average of 45% of the databases investigated have database corruption issues with a frequency of one in every 48 activities. The existence of problems in the databases does not necessarily prove that significant errors exist in the output but the prevalence of errors suggests that this could be true. Further investigation into cause-and–effects need to be made before definitive conclusions are reached. This research trial is too limited in outreach to be able to draw categorical results. However, it does suggest a widespread issue of P6 database corruption.

Contributors

The authors would like to thank the following companies for contributing to this research effort. They downloaded our software research tool, installed and configured it, and ran the analyses on their P6 databases. They then forwarded the results to the authors for compiling. This is only a partial list of the total number of respondents:

Calvey Consulting, LLC
Granite Construction, Inc.
Kitchell CM
Quandel Enterprises, Inc.
Schedule Analyzer Software

References

No.   Description

1   My Oracle Support
        How to Include Project Integrity Checking In a Database Maintenance Plan (Doc ID 1315895.1)
        06-Sep-2016 (Last Update)

2   My Oracle Support
        Check Project Integrity Utility: Description of Utility Including detailed SQL statements Executed (Doc ID 1083481.1)
        22-Feb-2017 (Last Update)

3   My Oracle Support
        What Are Correctable Errors in Check Project Integrity Function? (Doc ID 1267039.1)
        29-Jun-2016 (Last Update)

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       Error: 'An Error Has Occurred. Please Contact Your System Administrator' When Adding Activities to a Timesheet in Team Member. (Doc ID 2061114.1)
       23-Sep-2016 (Last Update)

5   My Oracle Support
       POBS Table Has Grown in Size and Affects Performance With Project Import/Export (Doc ID 1967569.1)
       3-Feb-2017 (Last Update)

6   My Oracle Support
       P6 Professional Client Set to Full Screen Does Not Show Menu or Toolbar Options (Doc ID 2152221.1)
       22-Jun-2016 (Last Update)

7   My Oracle Support
       How To Delete A User's Application User Preference Settings (Edit, User Preferences) If The Account Has Become Corrupted In Project Management Or Web Access (Doc ID 894279.1)
       12-Jul-2016 (Last Update)

8   LinkedIn blog
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       https://www.linkedin.com/grp/post/3305048-5925257185691979779

9   Corrupt files Checker module of Schedule Analyzer Enterprise Forensic
       Ron Winter Consulting, LLC
       http://scheduleanalyzer.com/eforensic_brochure.htm