



Performance Testing Methodology & Framework for IBM TM1 & Planning Analytics Solutions:

Sample Template for Script Development & Management

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Andreas Kugelmeier

Executive Consultant, FOPM

Planning Analytics Architect

IBM

Mobile Phone: +1-215-384-7302

Email: kugelmeier@us.ibm.com



Business Analytics software

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1. INTRODUCTION

1.1 PURPOSE

This document identifies and documents the usage scenarios and associated script(s) used to simulate usage patterns. The test scripts will baseline and measure the performance and scalability of various end user scenarios. Performance and scalability testing will be performed to ensure the principal application design and hardware environment can support the expected concurrency and meet scalability expectations as outlined below. Testing will be done in a dedicated test environment in order to measure, analyze and report the application's response times, capacity, and stress levels under various user loads and business scenarios.

The tests will measure & analyze performance, response times, load etc. on both

- a) the TM1 Web environment (running on a Java Web Application Server like Apache Tomcat) and
 - b) the TM1 Application Server environment (i.e. Apache Tomcat),
 - c) Planning Analytics Workspace
 - d) Cognos BI server and interfaces (leveraging TM1 as a data-source),
 - e) TM1 Perspectives and/or CAFÉ/PAX
 - f) the TM1 OLAP server,
- with (a)-(e) representing user interfaces.

1.2 GOALS

1. **Validate Functionality**

- Does the system function as required / per spec?

2. **Validate Reliability/Scalability**

- What are the maximum stress levels that the system can handle?
- What are the maximum stress levels that the system should handle?
- What is the expected stress level at average expected load?

3. **Validate Speed**

- What are the response time at maximum load?
- What are the response times at maximum expected load?
- What are the response times at average expected load?

4. **Expose, Isolate & Assist (EIA)** in alleviating contention issues

- Where do we get contention?
- Is this expected and acceptable (i.e. OK) or do we need to do something about it?
- What is the context of the contention and what causes it?
- How to we address it?

5. Performance-related **regression testing**:

- Will a new functionality affect performance (FRS)?
- If yes, how so? (which areas are affected?)

1.3 OUT OF SCOPE

A. Excluded are tests ...

B. Excluded is testing for ...

Examples:

- Test run from various geographical locations: the geographic domain of the tests is the <Region> region only.
- Endurance and tuning with this test. Testing only for capacity and load of the application.

1.4 TEST STRATEGY

Test the business scenarios for baseline testing in the current dedicated load-test environment. The performance, capacity, and stress tests will utilize business scenarios, which includes a combination of business critical, high consumption of resources and/or long running transactions, and most common scenarios, which target the web and (indirectly, via the web-server) TM1 OLAP server.

Peak concurrent Users / hour:

Application Categories and/or User Profiles (each consisting of 1 or more test scripts)	Total # of Users	# of PAW Users	# of TM1 Application Server users	# of TM1 Web users	# of Cognos BI users
Total Users					

The peak concurrent users are approximately **XXX** users per hour. For workload profile 1 run a capacity test and a load test at 80% of results of capacity test and run a test at **XXX** users / hour (peak concurrency). The average concurrent users are $\text{<TPCU>} * 0.2$ users per hour (20% of TPCU).

Use initial tests as a baseline. It is expected that some user-defined reports and queries will take longer than the baseline test indicates, depending on the amount of requested data, network traffic, geographic location, external or internal customer location, and the number of people using the application concurrently. Note that the query and input response times for workload profiles that include processing of data (Test Scenarios <...>) will take much longer while the data processing jobs are running. This is expected and normal and will not impact usability of the system because the data processing jobs do not run frequently. Again, results of testing will be used as baseline for response times.

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1.5 TEST ACCOUNTS

Ideally, the performance test should be conducted with data individual test accounts for each virtual concurrent user that belongs to a write-back user group. In other words: ideally one should not use a test account/login/UserID more than once concurrently within a user test.

To facilitate the generation of hundreds of users for the Load Test, the <TM1 Application> Development team can provide the test team with a utility to generate users with default passwords and automatically assign the users to specified tester user group.

Each TM1/PA Application/Solution/Model will have different user group types assigned. Each test-user will be assigned to one Application only and to one of the below user types. The below user group types are to be assigned to their corresponding TM1 security groups (i.e. the user groups used during test-planning may be different than the user groups and names used in TM1). It is however recommended to use user names as suggested below as this makes test troubleshooting and analysis easier (in that each user name allows easy identification of the user's planning & analysis footprint).

- a) <Application>_Contributors (only if application provides input/contribution capabilities): Contributor types are different by their write access credentials
 - <Application>_Contributor_<WriteAccessGroup>_<UserN>: These are test accounts for write-back, each reflecting a user who inputs FCST/Plan data for a specific business area. The Contributors will primarily use the FCST/Plan input templates & Applications but may also run views/reports for their specific pools against the (reporting) cubes and (potentially) also against the input cubes directly...
- b) <Application>_Consumers: Consumer types are different by their read access credentials
 - <Application>_Contributor_<WriteAccessGroup>_User<N>: These are test accounts for write-back, each reflecting a user who inputs FCST/Plan data for a specific business area. The Contributors will primarily use the FCST/Plan input templates & Applications but may also run views/reports for their specific pools against the (reporting) cubes and (potentially) also against the input cubes directly..
- c) Application/System Administrators or Super Users:
 - Test Account(s) each for User Attribute Maintenance and Model Control. The accounts will be used to perform data-processing and maintenance tasks. The primary data-processing tasks are to be run at the beginning (prior to) and/or end of a testing session (not while most users are actively inputting data).
 - In case the tests will not be conducted using individual test accounts, i.e. in case user accounts will be used for multiple logins and simultaneous sessions: Make sure that Users have a correspondingly high 'Max Connections' setting (in such that they can log in multiple times as illustrated below. **<Screenshot>**).

1.6 TEST SCRIPT PREPARATION

1.6.1 TM1RestApi

...

1.6.2 TM1 Web

Optional: Because the scalability test will leverage unique user IDs, with each user ID assigned to a specific tester group / profile, we can use a lookup model 'DefaultSubsetMaintenanceAndLookup.cub' to identify default dimension subsets (and – if applicable and specified in the test scripts below - default elements) for each virtual user via the values for attributes 'Subset' and 'Element'¹:

Cube-View:

<Screenshot>

For each virtual test user, the attribute 'Subset' (the 'Element' attribute only if specified per test script) needs to be populated with values (default subsets) that correspond to the tester role of the virtual user. The assignment of the test subsets to the virtual user is to be done via the utility 'LoadTestCreateUsersAndAssignToSecurityUserRoleAndDefaultSubsets.pro' (process to be developed).

The corresponding subsets will be queried in each input template such that the proper subset is used when the SUBNM functions are called in the input templates. EACH import template hence needs to be modified as follows:

1. In three cells,

a. Query the User's Subset with the formula

```
=IF(<CellReferenceToEmptyCellInC>="",IF(DIMIX(ServerName&":UsersForDefaultSubsetAndElementMaintenance", TM1USER(<ServerName>))=0, "", DBR(<ServerName>&":DefaultSubsetMaintenanceAndLookup", TM1USER(<ServerName>), <DimensionName>, "Subset")), "")
```

b. Query the User's Subset Default Element with the formula

```
=IF(<CellReferenceToEmptyCellInC>="", IF(DIMIX(ServerName&":UsersForDefaultSubsetAndElementMaintenance", TM1USER(<ServerName>))=0, 3, DBR(<ServerName>&":DefaultSubsetMaintenanceAndLookup", TM1USER(<ServerName>), <DimensionName>, "Element")), "")
```

c. Leave an **EMPTY cell** (NO value) to allow drilldown from another sheet/workbook

Note: IF(DIMIX(ServerName&":UsersForDefaultSubsetAndElementMaintenance", TM1USER(<ServerName>))=0, 3,

Or IF(DIMIX(ServerName&":UsersForDefaultSubsetAndElementMaintenance", TM1USER(<ServerName>))=0, "",

Will ensure defaults are set for ADMIN users (who are not part of the User list for default subsets and element maintenance).

¹ By automatically assigning specific subsets to each tester and thereby ensuring that each virtual tester will get subsets assigned that correspond to its testing function, this testing method greatly simplifies test script recording algorithms while at the same time greatly improving testing accuracy and reliability.

2. Modify the SUBNM for the <DimensionName> as follows:

=SUBNM(<ServerName>&":"&<DimensionName>,<CellReferenceTo_1a_Above>,<CellReferenceTo_12_Above>)

Security requirements for the cube 'DefaultSubsetMaintenanceAndLookup.cub': Each test role (below screenshot uses '<Company> Tester' as a sample role) needs to get READ or WRITE access to the following objects:

Cube:

'DefaultSubsetMaintenanceAndLookup.cub'

Dimensions:

'DimensionsForDefaultSubsetAndElementMaintenance.dim'

'UsersForDefaultSubsetAndElementMaintenance.dim'

'DefaultSubsetMaintenanceAndLookupMeasures.dim'

<Screenshots for Security Configuration>

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2. DEVELOPMENT OF USER-PROFILES / APPLICATION USE SCENARIOS

The Application Use Scenarios can be assigned to the following transaction types that are representative of the <SystemName> application: **Business Critical (BC)**, **High Resource consumption (HR)**, **Most Commonly used (MC)** and **High Frequency (HF)**.

There are five role classes for the <insert number> Application Use Scenarios below:

- Analysts,
- Contributors/Planners,
- Contribution Managers/Approvers,
- Report Consumers,
- Application/System Administrators.

While <Test Tool> has to be used to simulate test Application Use Scenarios <insert>, the Scenarios <insert> (part of workload profiles <insert>) could alternatively be simulated by one (1) or more actual (real) users running the data processing jobs in parallel to the <Test Tool> simulations. This may be a feasible test scenario because the data processing jobs are (see above) run infrequently.

Application Usage Scenarios:

2.1 SCENARIO A.X

Description: ...

Corresponding Test Scripts (Description, Characterization, Classification): ...

2.2 SCENARIO ...

Description: ...

Corresponding Test Scripts (Description, Characterization, Classification): ...

2.3 APPLICATION USE SCENARIO MATRIX

Number	Scenario Title	BC	HR	MC	HF	Role Class	Workload Profile 1 typical forecast cycle – high-intensity input, high concurrency)	Workload Profile 2 Overnight processing – low concurrency	Workload Profile 3 Mixes aspects of profiles (1) & (2) during times of medium concurrency ²	Workload Profile 4...N
							Capacity Test, Load Test,	Capacity Test, Load Test,	Capacity Test, Load Test,	
1.	US Workforce Planning Contributor	X		X	X	Contributor	%?	%?	%?	
2.	US Workforce Planning Manager	X		X	X	FP&A Manager	%?	%?	%?	
3.	US SG&A Analysis	X		X		Consumer	%?	%?	%?	
4.	...	X		X	X	Contributor	%?	%?	%?	
5.	...	X		X		Consumer	%?	%?	%?	
6.	User Attribute Maintenance	X	X	X		Maintenance / Administration	%?	%?	%?	
7.	Model Control 1: Actuals processing	X	X	X		Maintenance / Administration	%?	%?	%?	
8.	Model Control 2: Data Validation & Reconciliation	X	X	X		Maintenance / Administration	%?	%?	%?	

² i.e. only few users with only applicable transactions (scripts)

3. SCENARIO SCRIPTS (SAMPLE OUTLINE)

3.1 SCENARIO A SCRIPTS

3.1.1 Scenario A.1 Script: <Name>

Sample Script-Outline for Perspectives or TM1 Web

Step #	Description	Expected Result	Notes
1	Type in the URL: ...		
2	Enter TM1 User ID "<Application>_Contributor_<WriteAccessGroup>_<UserN>" in the login dialog box <Screenshot Login Screen>		You will be logged into TM1 using test accounts
3	Enter password 'Temp1234" in the password login dialog box and click 'login'. You should see a screen like this: <Screenshot Application/Welcome Screen> (TBD)		Using passwords assigned to test accounts
4	Open the node '<Node>' / Click on ... and then open to the sub-node <BU>: <Screenshot> And then click on '<templatename>.xls' to open the input template: The template will open in the right viewing pane. Then, hide the navigation tree by clicking on the left-pointing arrow as indicated below: <Screenshot>		
5	Enter the Point of View that corresponds to the test user role (X roles): a) Click on the double arrows to the right of <CellInTemplate> in order to select an element (will be empty and NOT show the parent node as in the below screenshot) <Screenshot>		

b) In the subset editor window, select ANY element below the parent node (note: the child # should be a number that is randomly assigned, i.e. each script with user TestUser<AccessGroup> and should randomize the <ApprovalHierarchy>):

<Subset Editor Screenshot>

(above, the element with index No 4 is selected)

c) Click 'OK':

d) Highlight ... in the ... section as indicated below:

<Screenshot>

(avoid the grayed-out area)

e) Make a right mouse click, select data-spread and then 'Repeat' as indicated below:

<Data Spreading Screenshot>

f) Enter a value that is equal to the day and a military timestamp (like 112344 for 11:23:44) (for example), select 'Replace' and click 'Apply'

<Spreading Value Entry Screenshot>

g) You should not see the value you entered in all the input cells you highlighted (if you also selected non-input cells the new value will be ignored for those and calculations may apply to the cells)

h) Click the button 'Save / Refresh (F9): 

i) Click the button 'Submit to Reporting Cube(s)...(if applicable)':

j) Pause for 30 seconds and then repeat this action with the lower part of the work-sheet:

<Screenshot>

&

<Spreading Value Entry Screenshot>

k) You should see a result such as:

<Screenshot>

l) Pause for a few minutes and then repeat steps (b) through (k) with a DIFFERENT, randomly assigned department (same Pool) (minimum of 3 departments per Pool)

3.1.2 Scenario A.2 Script: <Name>

...

3.1.3 Scenario A.3 Script: <Name>

...

3.2 SCENARIO B SCRIPTS

3.2.1 Scenario B.1 Script: <Name>

...

3.2.2 Scenario B.2 Script: <Name>

...

3.2.3 Scenario B.3 Script: <Name>

...

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