

Dynamics 365 finance and operations apps UI performance testing with JMeter

Presenter(s):

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Agenda

- Introduction of JMeter
- Demo
- Importance
- FAQ
- Q&A

Introduction

Ajay Kumar Singh



Introduction

- What is JMeter?
- Why is JMeter?
- How with JMeter?



PerfSDK vs JMeter

Performance SDK	JMeter
Developed and supported by Microsoft but Visual Studio 2019 is the last version of Visual Studio that includes web performance and load testing features and these will be deprecated in the future.	Supported by a large community. It offers cross-platform compatibility and portability.
Single-user and multi-user testing supported, but required Visual Studio Enterprise edition for multi-user testing.	Open Source , single-user and multi-user testing supported.
.Net framework.	Java application.
Steps captured by using Task recorder inside of Dynamics 365 finance and operations apps, and converted to C# script by Dynamics 365 add-in tool in development environment.	Recording of the steps and scripts execution done by natively by JMeter.
Script files can only run on the finance and operations apps development machine.	Script files can be executed on any machine with the necessary Java prerequisites installed.
Test users created in Dynamics 365 finance and operations apps.	Microsoft Azure Active Directory (Azure AD) user setup is required and with assigned security role in Dynamics 365 finance and operations apps.

JMeter UI

Right click to add elements

Start test

Start test ignoring sleep time

Stop test

Stop test, wait for samplers to end

Test execution time

Number of errors in log

running threads/# total threads

Help

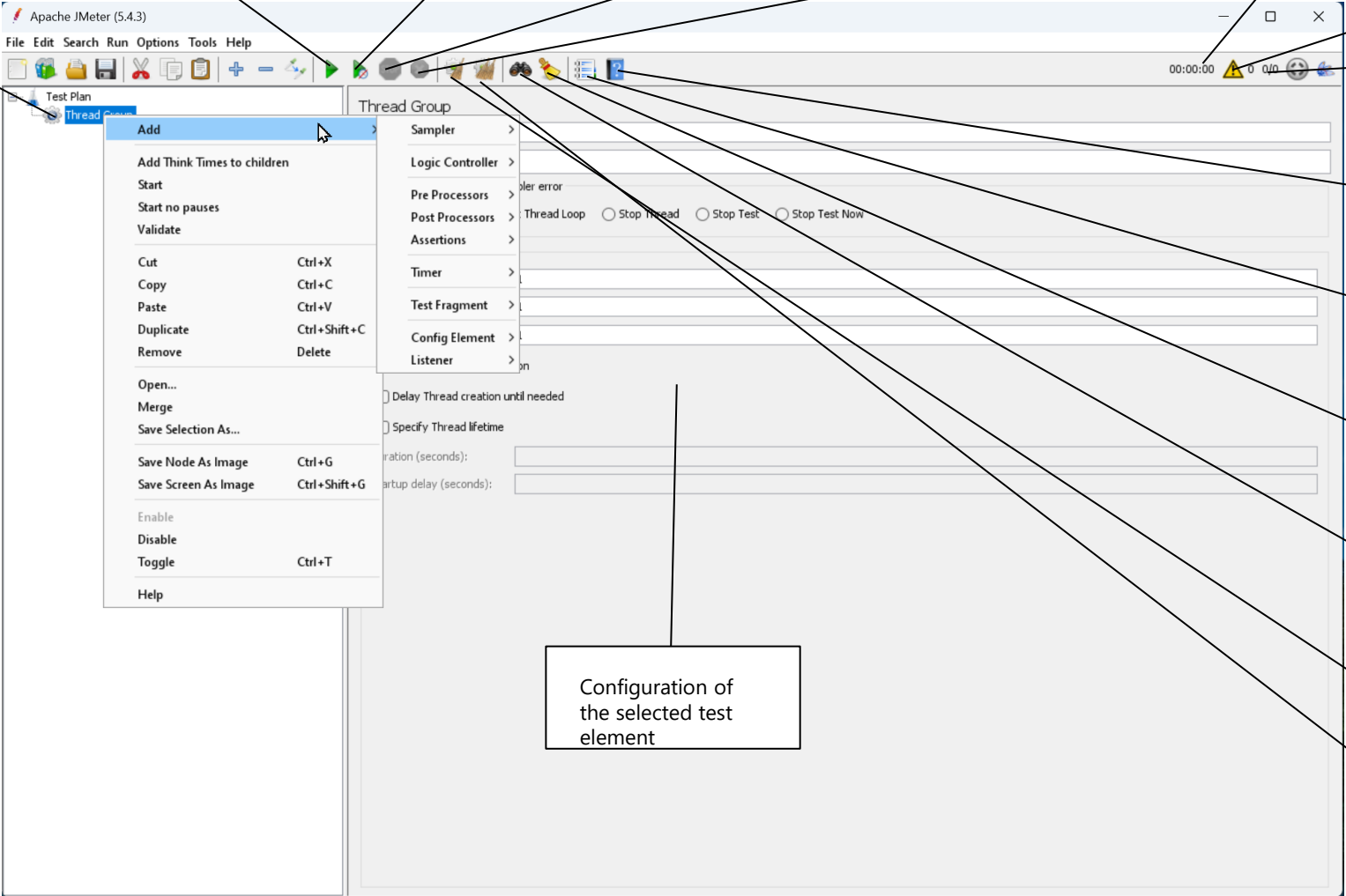
Function helper

Reset search

Search/replace in test elements

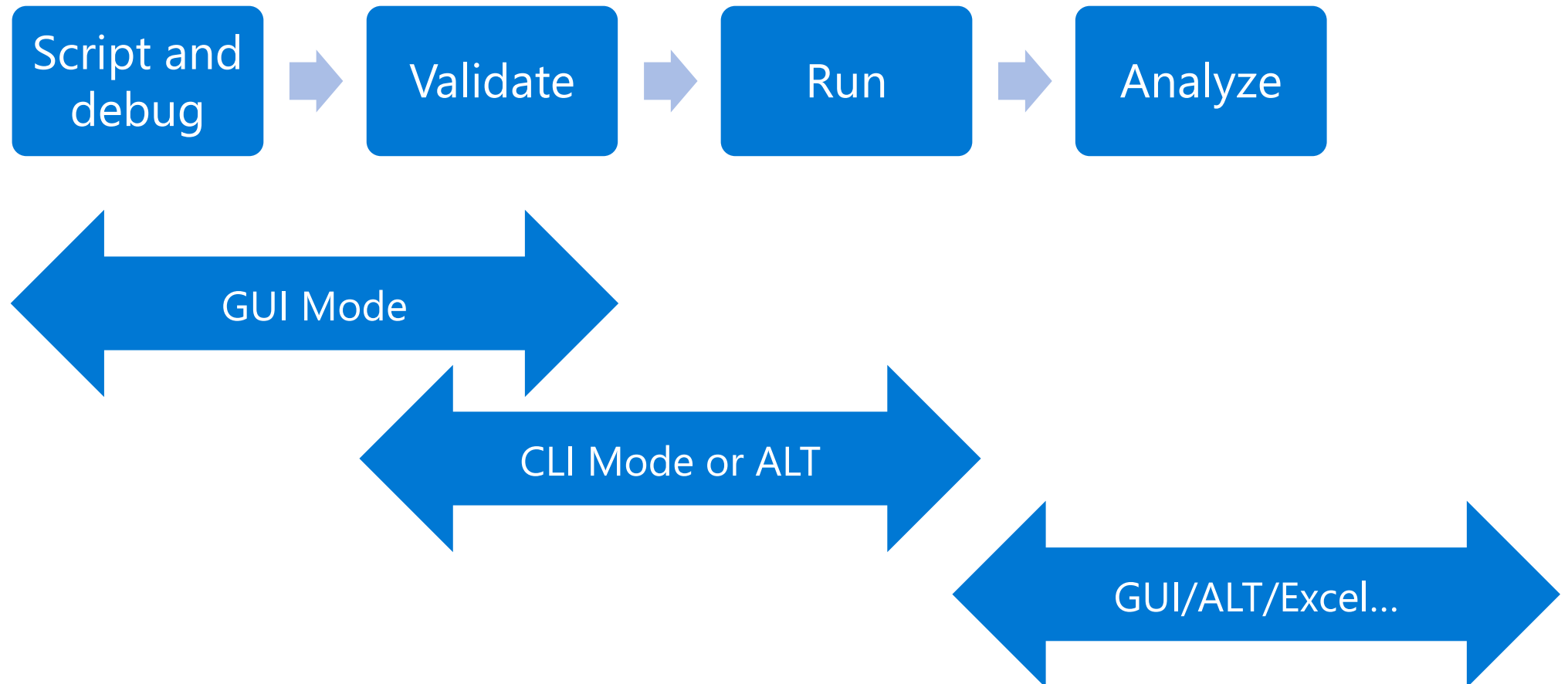
Clean all listeners

Clean selected listener



Configuration of the selected test element

Test lifecycle in JMeter



ALT = Azure Load Testing Service

Demo

Edison Lai



Prerequisites

- Configure a development environment
- Install Plugin (bzm – Correlation Recorder)
- Installing the JMeter CA certificate for HTTPS recording and Configure your browser to use the JMeter Proxy
- Create and setup the Test Plan (CreatePOAndSubmitWorkflow.jmx)
 - User Defined variable
 - HTTP Request Defaults
 - bzm - Correlation Recorder
 - Requests Filtering
 - Correlation Rules

Demo Scenarios

Background:

Company would like to understand how is the system behavior and performance if 100 PO required to be created and submit purchase order to approval workflow by 10 Purchase Agent in the peak windows. The test result can provide the insight of the system healthy.

Business scenarios:

Purchase Agent

1. Purchase Agent Sign into Dynamics 365 finance and operations apps using user credentials.
2. Go to Procurement and sourcing module then Create a Purchase Order with 2 items.
3. Save the Purchase Order and submit to workflow.
4. Purchase Agent Sign out from the application.

Demo – Recording





Retail Tenant...



Generate Self-Sign...



Document Routing ...



AdminUser...



TechTalk



Windows Azure Acti...



Store Commerce



Install or update Ret...



Google Chrome



Firefox



Adobe Acrobat



Recycle Bin



..ll

mw-144.myworkspace.microsoft.com



CreatePOAndSubmitWorkFlow.jmx (C:\apache-jmeter\bin\FnO_JMeter_Template\CreatePOAndSubmitWorkFlow.jmx) - Apache JMeter (5.6.2)

File Edit Search Run Options Tools Help

Test Plan

- User Defined Variables
- HTTP Request Defaults
- HTTP Cookie Manager
- Thread Group
 - Recording Controller
 - View Results Tree
 - Debug PostProcessor
 - bzm - Correlation Recorder**

bzm - Correlation Recorder

Name:

Comments:

State

Start Stop Restart

Global Settings

Port: 8877

HTTPS Domains:

Test Plan Creation Requests Filtering Correlation

Load Template Save Template Clear Correlation's Wizard Open Suggestion Panel ☐ Enable Correlation (Legacy)

Correlation Rules Groups

Group-1

Reference V...	Correlation Extractor	Correlation Replacement
<input checked="" type="checkbox"/> state1	Regex <input type="text" value="state=([^\&]+)"/>	Regex <input type="text" value="state=([A-Za-z-\&]{"/>
<input checked="" type="checkbox"/> nonce	Regex <input type="text" value="nonce=([A-Za-z0-9-]"/>	Regex <input type="text" value="nonce=([A-Za-z0-9-]"/>
<input checked="" type="checkbox"/> hpqid	Regex <input +?)"<="" hpqid".(,="" td="" type="text" value=","/> <td>Regex <input type="text" value="hpqid=(, +?)&"/></td>	Regex <input type="text" value="hpqid=(, +?)&"/>
<input checked="" type="checkbox"/> hpqid	Regex <input +?)"<="" hpqid".(,="" td="" type="text" value=","/> <td>Regex <input type="text" value="hpqid: ([0-9]{4})"/></td>	Regex <input type="text" value="hpqid: ([0-9]{4})"/>
<input checked="" type="checkbox"/> hpqact	Regex <input +?)"<="" hpqact".(,="" td="" type="text" value=","/> <td>Regex <input type="text" value="hpqact=(, +?)&"/></td>	Regex <input type="text" value="hpqact=(, +?)&"/>
<input checked="" type="checkbox"/> hpqact	Regex <input +?)"<="" hpqact".(,="" td="" type="text" value=","/> <td>Regex <input type="text" value="hpqact: ([0-9]{4})"/></td>	Regex <input type="text" value="hpqact: ([0-9]{4})"/>
<input checked="" type="checkbox"/> Client-reqe...	Regex <input <="" td="" type="text" value="client-request-id=(, +?)"/> <td>Regex <input <="" td="" type="text" value="client-request-id=(, +?)"/></td>	Regex <input <="" td="" type="text" value="client-request-id=(, +?)"/>
<input checked="" type="checkbox"/> Client-reqe...	Regex <input <="" td="" type="text" value="client-request-id=(, +?)"/> <td>Regex <input]"="" type="text" value="client-request-id: ([^"/></td>	Regex <input]"="" type="text" value="client-request-id: ([^"/>
<input checked="" type="checkbox"/> Hpgrquestid	Regex <input "(,="" +?)"<="" sessionid":="" td="" type="text" value=","/> <td>Regex <input type="text" value="hpgrquestid=(, {36}"/></td>	Regex <input type="text" value="hpgrquestid=(, {36}"/>
<input checked="" type="checkbox"/> ApiCanary	Regex <input "(,="" +?)"<="" apicanary":="" td="" type="text" value=","/> <td>Regex <input]s)+"="" type="text" value="canary: ([^"/></td>	Regex <input]s)+"="" type="text" value="canary: ([^"/>
<input checked="" type="checkbox"/> Canary	Regex <input "(,="" +?)"<="" canary":="" td="" type="text" value=","/> <td>Regex <input type="text" value="canary=([^\&]+)"/></td>	Regex <input type="text" value="canary=([^\&]+)"/>

Groups: Add Delete Up Down

Response Filters:

* This field allows to filter the responses by their MIME type (using regular expressions). You can add more than one separating them using commas. If left empty, no filtering will be applied.

BlazeMeter 14.05

Taskbar icons: Start, Search, File Explorer, Task View, Edge, Firefox, VS Code, etc.

System tray: Network, Volume, 8:09 AM 11/24/2023

Demo – Playback and Testing





CreatePOAndSubmitWorkflow.jmx (C:\apache-jmeter\bin\FnO_JMeter_Template\CreatePOAndSubmitWorkflow.jmx) - Apache JMeter (5.6.2)

File Edit Search Run Options Tools Help

Test Plan

User Defined Variables

HTTP Request Defaults

HTTP Cookie Manager

Thread Group

Recording Controller

1. Access to application

2. Go To PO list page

3. Create PO

4. Add first line detail

5. Add new line

6. Add second line detail

7. Save PO

8. Submit Workflow

9. Sign Out

View Results Tree

Debug PostProcessor

bzm - Correlation Recorder

Thread Group

Name: Thread Group

Comments:

Action to be taken after a Sampler error

☒ Continue

☐ Start Next Thread Loop

☐ Stop Thread

☐ Stop Test

☐ Stop Test Now

Thread Properties

Number of Threads (users): 1

Ramp-up period (seconds): 1

Loop Count: ☐ Infinite 1

☒ Same user on each iteration

☐ Delay Thread creation until needed

☐ Specify Thread lifetime

Duration (seconds):

Startup delay (seconds):



Demo – Multiple users testing





File Edit Search Run Options Tools Help

Test Plan

User Defined Variables

HTTP Request Defaults

HTTP Cookie Manager

CSV Data Set Config - Agent Login

Thread Group

Recording Controller

View Results Tree

Summary Report

Debug PostProcessor

bzm - Correlation Recorder

CreatePOAndSubmitWorkflow.jmx (C:\apache-jmeter\bin\FnO_JMeter_Template>CreatePOAndSubmitWorkflow.jmx) - Apache JMeter (5.6.2)

00:00:00 1 0/0

Test Plan

Name: Test Plan

Comments:

User Defined Variables

Name:	Value
-------	-------

Detail

Add

Add from Clipboard

Delete

Up

Down

☐ Run Thread Groups consecutively (i.e. one at a time)

☐ Run tearDown Thread Groups after shutdown of main threads

☐ Functional Test Mode (i.e. save Response Data and Sampler Data)

Selecting Functional Test Mode may adversely affect performance.

Add directory or jar to classpath

Browse...

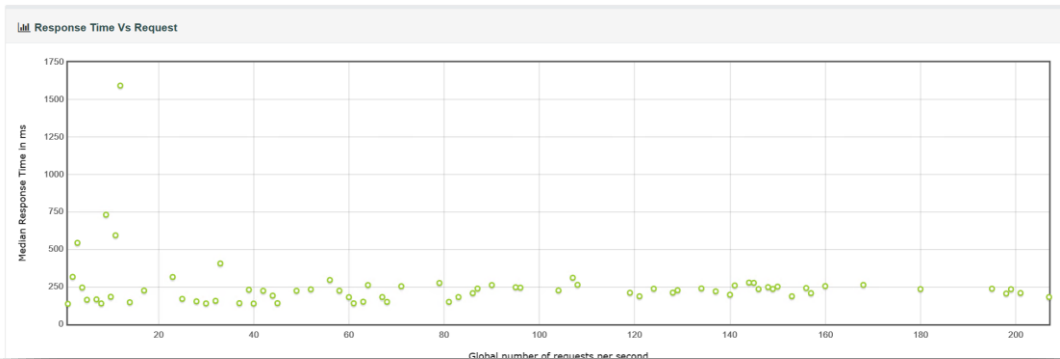
Delete

Clear

Library

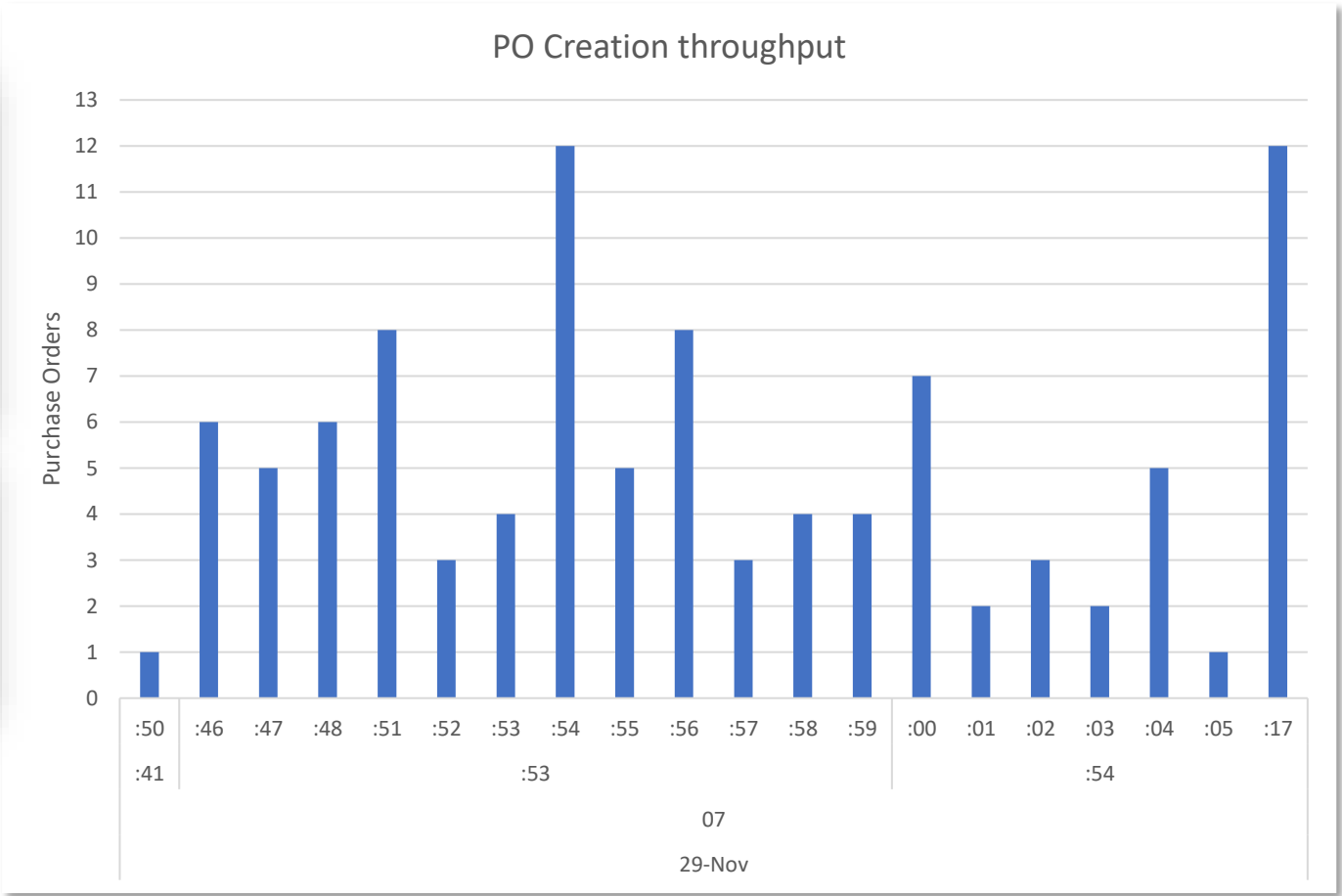
Report

Report from JMeter



Requests		Executions			Response Times (ms)						Throughput		Network (KB/sec)	
Label		#Samples	Fails	Error %	Average	Min	Max	Median	90th pct	95th pct	99th pct	Transactions/s	Received	Sent
Total		7800	0	0.00%	563.14	3	26446	229.00	825.90	2063.60	7900.82	68.11	562.43	0.00
1. Access to application		100	0	0.00%	5837.12	4498	8239	5741.00	7123.90	7530.30	8238.80	4.86	1734.61	0.00
2. Go To PO list page		100	0	0.00%	9001.41	3771	27498	7995.00	17726.80	21924.45	27491.82	3.50	197.25	0.00
3. Create PO		100	0	0.00%	10428.00	5641	19154	9414.00	18578.80	18764.25	19152.93	2.36	184.86	0.00
4. Add first line detail		100	0	0.00%	4994.46	2496	9915	3778.00	9513.40	9809.55	9914.76	2.23	73.60	0.00
5. Add new line		100	0	0.00%	2238.85	1011	3833	2041.50	3633.00	3681.50	3832.21	2.20	30.65	0.00
6. Add second line detail		100	0	0.00%	3643.94	2843	4708	3569.00	4353.40	4490.15	4707.87	2.09	77.58	0.00
7. Save PO		100	0	0.00%	1108.01	712	1621	1040.50	1473.90	1543.55	1620.56	2.17	25.69	0.00
8. Submit Workflow		100	0	0.00%	5604.41	1693	15685	2958.00	15008.80	15490.10	15684.86	1.65	27.54	0.00
9. Sign Out		100	0	0.00%	1068.65	825	1943	958.00	1445.80	1541.45	1841.03	1.70	67.44	0.00

Report from data in F&O



Demo – Azure Load Testing





Test Plan

- User Defined Variables
- HTTP Request Defaults
- HTTP Cookie Manager
- CSV Data Set Config - Agent Login
- JDBC Connection Configuration
- Thread Group
 - View Results Tree
 - Summary Report
 - Debug PostProcessor
- bzm - Correlation Recorder

User Defined Variables

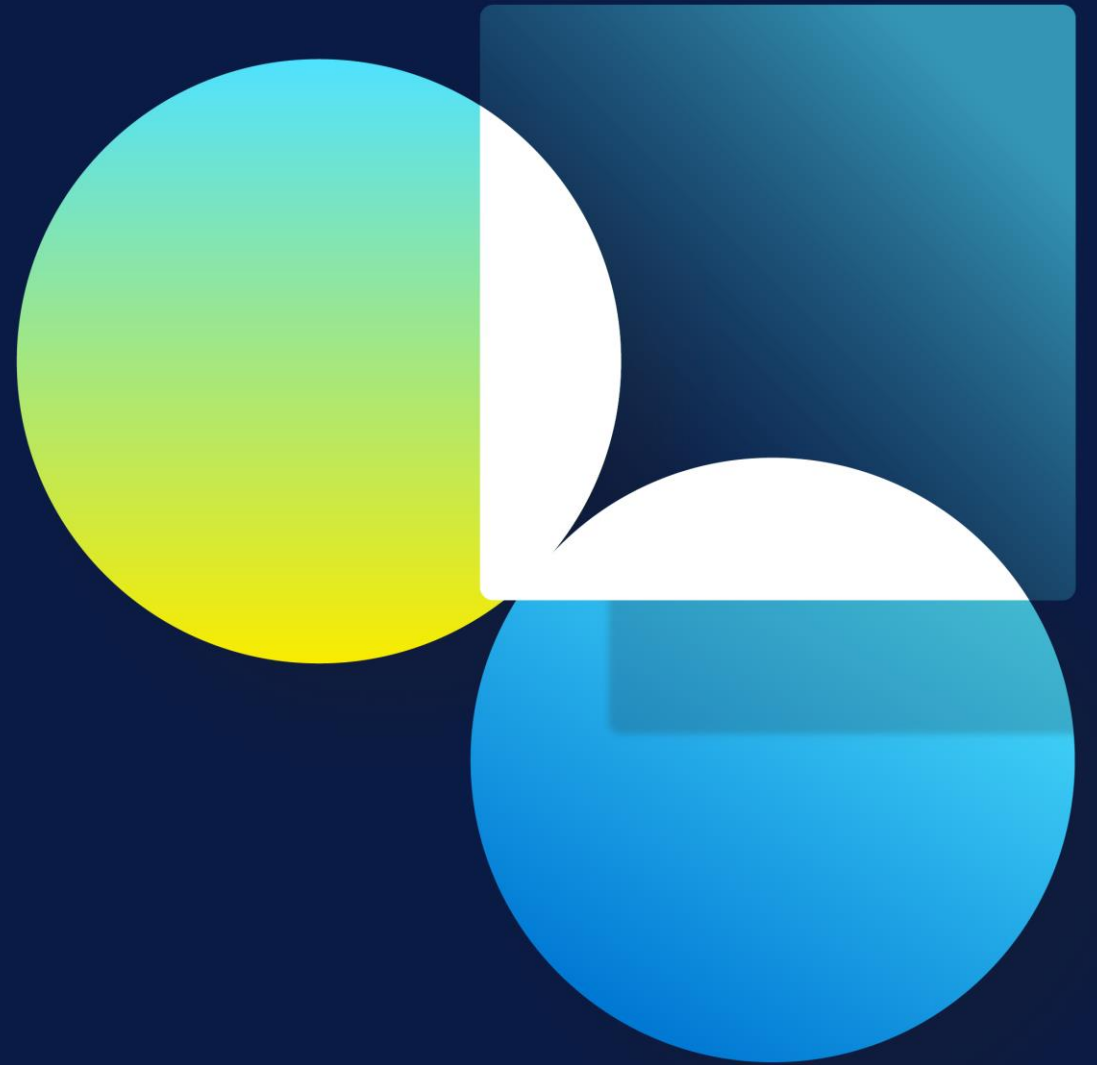
Name: User Defined Variables

Comments:


User Defined Variables		
Name:	Value	Description
host	\${ BeanShell System.getenv("ALT_Host") }	
scheme	\${ BeanShell System.getenv("ALT_Scheme") }	
PONumber	0	
retry	0	
ConcurrentUser	\${ BeanShell System.getenv("ALT_Concurrent") }	
Loop	\${ BeanShell System.getenv("ALT_Loop") }	

Importance

Edison Lai

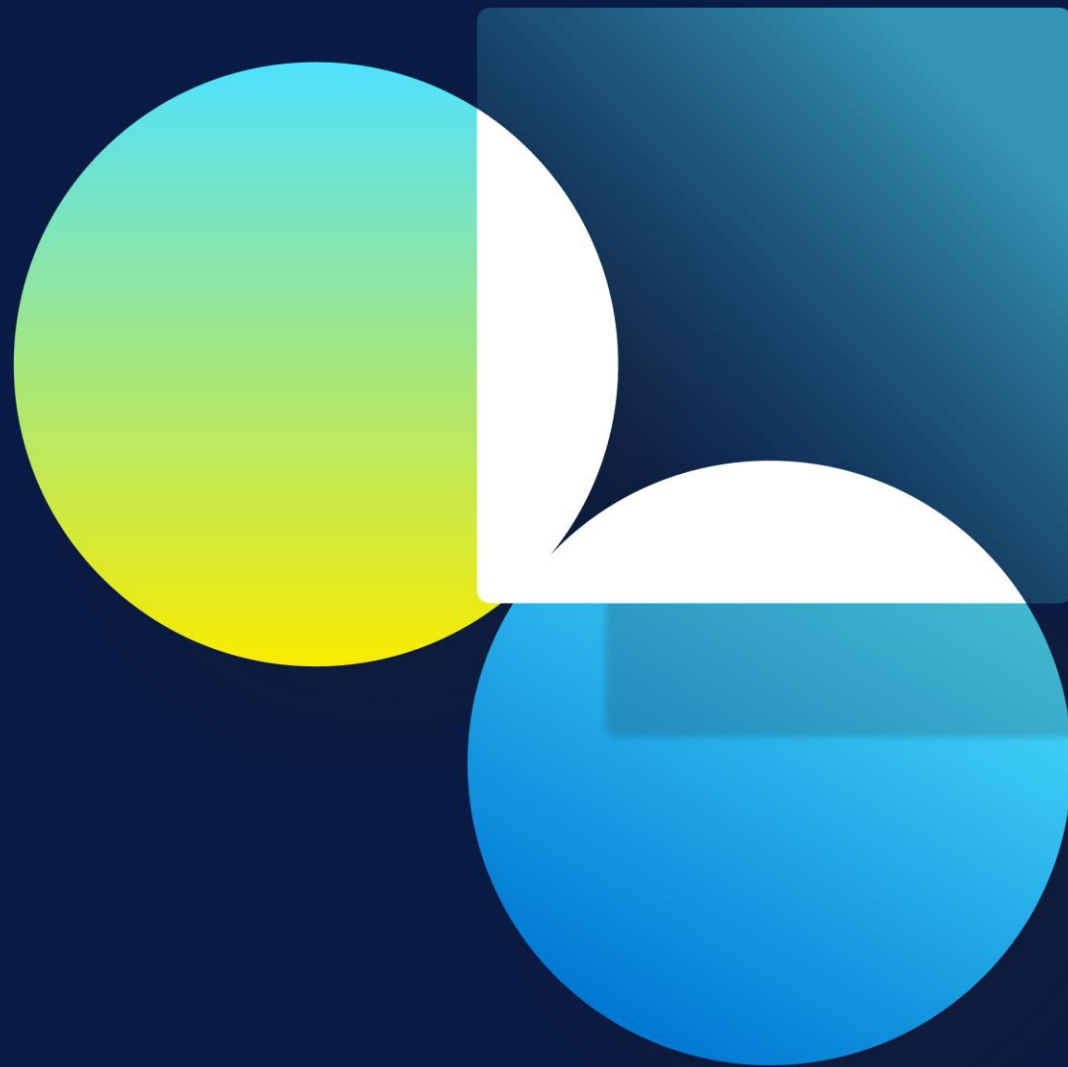


Importance

- 
- 1 The approach only support T2+ cloud environment
 - 2 Run a complete end-to-end scenario before recording
 - 3 Verify that everything functions as expected by replaying the recorded task
 - 4 Actual Testing user (AAD) required to be created for multiple users testing
 - 5 Do not conduct performance testing in Production environment

FAQ

Edison Lai



FAQ

Q1 Is it possible to initiate the recording directly from the F&O without going through the login process?

Initiate the recording process beginning with the Login phase, as the session should be captured comprehensively from start to finish.

Q2 What is the practice to work if MFA enabled?

it's generally recommended to temporarily disable MFA for performance testing. MFA adds an additional layer of security by requiring users to provide multiple forms of identification. It is possible to achieve with MFA but it is complex, we should focus on Application performance testing.

Q3 Is possible JMeter testing script be generated from Tier-1?

It is possible but our provided D365 Login template is not support Tier-1, and there are variance of Auth, so the script from Tier-1 isn't working in Tier-2/+ environment.

Q4 Can I use dummy testing user for performance testing?

No, Azure AD user is required.

Q5 Is it support On-perm environment

It is possible to do performance testing in On-perm but my template and script is not support on Perm, you need to create your own template for login auth.

FAQ

Q6 Can we execute multiple test plan from same machine at the same time? We have the requirement to do performance testing for 4 different processes at the same time?

Yes, it is possible to execute multiple processes simultaneously. One approach is to run different testing command in separate Command Prompt windows.

Q7 Does user defaults and personalization's affects the test run. I had issue previously where for one user, the tab is minimized by default and Jmeter test was not running for that user?

We should anticipate that the behavior from recorded scenarios will be replicated for each test user. Any personalization differences in the test users could potentially affect the test results.

Q8 Could we use the recordings from D365FO Task Recorder?

No, D365 Task Recorder recording cannot be translated to JMeter test script.

Q9 Why don't use the system admin role for test users?

Some of form/UI related scenario performance differs for Admin/specific roles. System admin accounts have higher privileges and may not be subject to the same constraints as regular user accounts. This can lead to unrealistic test conditions and results that do not accurately reflect the performance experienced by standard users. It's always recommended to use right set to role so that you are capturing realistic data.

FAQ

Q10 Is it possible to import the response times into a DB so that they can be displayed in PowerBI?

Yes, when you conducted multiple user testing and you should have result CSV which stored response time in each of transaction, so you should be able to import CSV into PowerBI tools. [Get data from comma separated value \(CSV\) files - Power BI | Microsoft Learn](#)

Q11 Can test scripts be parameterized using a similar mechanism as in RSAT, i.e. using excel/csv

Yes, JMeter test scripts support parameterization of your performance scripts using a CSV file.

Q12 Can I also manage the data (vendors, items, customers) in a local database so that JMeter selects one of these master data randomly?

Yes, JMeter provided JDBC Connection and JDBC Request sampler to connect local database.

Q13 Can we handle custom forms in JMeter scripting?

Yes, custom forms/UI can be handle by JMeter scripting.

Q14 How it differs from RSAT and what is the recommendation to when to use RSAT or JMeter or both?

RSAT is an Automation tool designed for regression testing where as JMeter is a performance testing tool

FAQ

Q15 What are the technical skills required to do configure JMeter because most of the Dynamics users don't have these skills?

A certain level of technical knowledge is required for the installation and configuration. However, once the test cases and test plan are created, the process becomes straightforward. It involves data input and execution, which can be performed by anyone. Furthermore, it can also be integrated into DevOps.

Q16 Is the JMeter is the tool for performance testing from long term roadmap?

JMeter in market since 1998 and one of the most popular tools, so it is going to be for longer term for performance testing tools.

Q17 Does JMeter support simulating geographical distribution of test users to test loads from different regions? (something we could do in PerfSDK using dedicated VMs)

This can be done in two ways - use dev box in other Geo to execute test cases, other option is using Azure Load Testing service (you can choose azure)

Additional resources

Blog series included:

- [Part 1 – Dynamics 365 finance and operations apps performance testing with JMeter – Introduction](#)
- [Part 2 – Dynamics 365 finance and operations apps performance testing with JMeter - Execution](#)
- [Part 3 – Dynamics 365 finance and operations apps performance testing with JMeter - Result Analysis](#)
- [Part 4 – Dynamics 365 finance and operations apps performance testing with JMeter - Tips and Troubleshooting](#)

[Dynamics Community Blogs](#)

[Create a JMeter-based load test - Azure Load Testing | Microsoft Learn](#)

[Customize load tests with JMeter plugins - Azure Load Testing | Microsoft Learn](#)



QUESTIONS

Dankie Faleminderit **Shukran** Chnorakaloutioun Hvala Blagodaria
 Dĕkuji **Tak** Dank u Tānan Kiitos **Merci** Danke Ευχαριστώ A dank
 Mahalo ἡΤΙΠ. **Dhanyavād** Köszönöm Takk Terima kasih **Grazie** Grazzi

Thank you!

감사합니다 Paldies Choukrane Aċiū **Благодарам** ありがとうございます
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