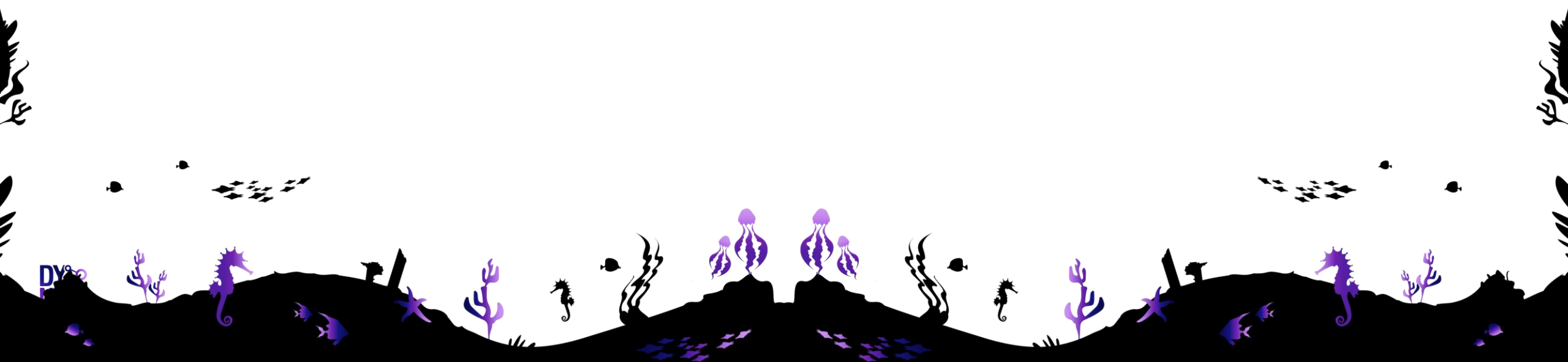




Bert Verbeek
MVP | Technical Solution Architect
4PS Group

How to measure the performance in Business Central



Speaker's Intro

- Bert Verbeek
- Working with NAV/BC for 16 years in several roles
- Technical Solution Architect @ 4PS Group
- Microsoft MVP – Business Applications
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What to expect

- What is the Performance Toolkit?
- Investigate the scenario's
- Writing test scenario's
- Start the test
- VS Code extension
- Analyse your results

What is the Performance Toolkit?





Does my solution for Business Central support X number of users doing this, that, and the other thing at the same time?



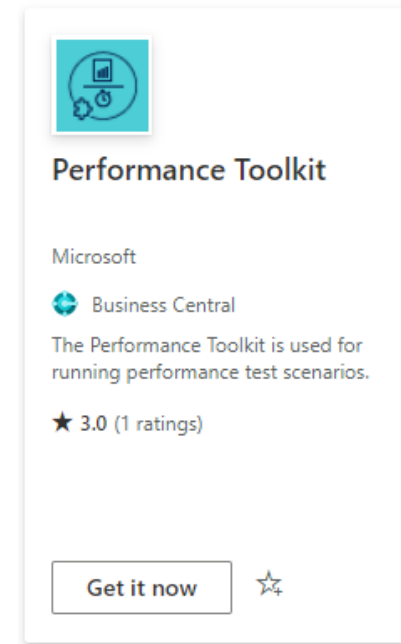


How many orders can Business Central process per hour?



What is the Performance Toolkit?

- Extension in Business Central
- Framework to define test scenarios and run it in parallel
- Only in Sandbox or in Docker
- Simulate max 500 user sessions



Why?

- Helps customers get confidence
- Test your development
- Test your solution
<http://aka.ms/bcall> - Telemetry and Performance

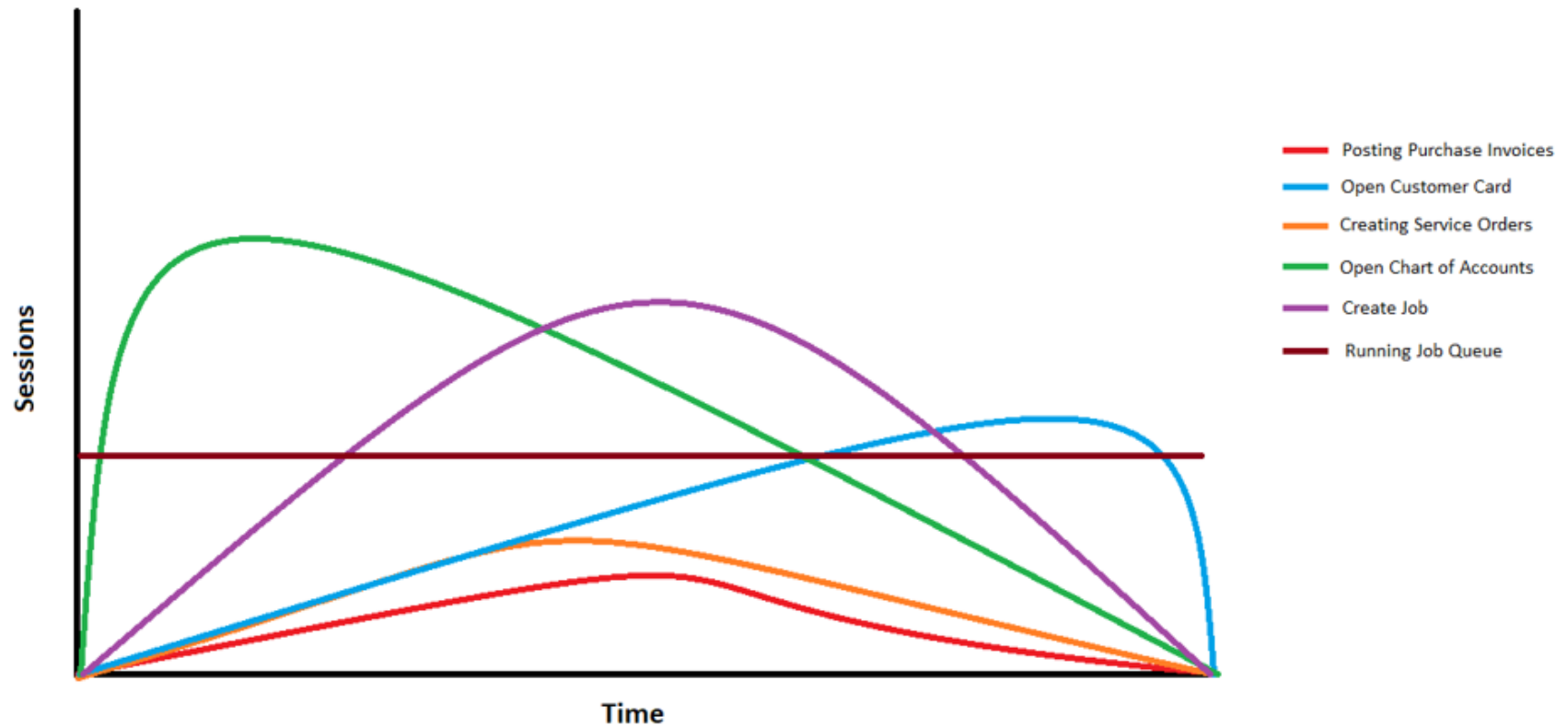


Investigate the
scenario's



Investigate the scenario's

- What are users doing all day?



Investigate the scenario's

No.	Codeunit ID	Description	Parameters	Company	Total time BCP	100%	75%	50%	Iterations per day	Total iterations p	Waiting tim	Delay Type
2	81009	PTK Open Project Control 4PS		Inrichtingsbedrijfs ██████	300	40	43	7	160	100.0	180.0	Fixed
3	81013	PTK Add Extension Contract 4PS		Inrichtingsbedrijfs ██████	300	40	43	7	1274	796.2	120.0	Fixed
7	81021	PTK Add Project Prognosis 4PS		Inrichtingsbedrijfs ██████	300	40	43	7	1	0.6	28800.0	Fixed
11	81004	PTK Add Service Order 4PS		Inrichtingsbedrijfs ██████	300	40	43	7	102	63.7	282.6	Fixed
12	81005	PTK Open Serv. Order Card 4PS		Inrichtingsbedrijfs ██████	300	50	54	9	306	191.1	120.0	Fixed
14	81010	PTK Add&Post Purch. Order 4PS		Inrichtingsbedrijfs ██████	300	40	43	7	1274	796.2	120.0	Fixed
17	81029	PTK Open Post. Puch. Inv. 4PS		Inrichtingsbedrijfs ██████	300	40	43	7	328	204.8	120.0	Fixed
18	81034	PTK Open Purch. Order Card 4PS		Inrichtingsbedrijfs ██████	300	60	64	10	258	161.4	120.0	Fixed
19	81015	PTK Open Chart of Accounts 4PS		Inrichtingsbedrijfs ██████	300	40	43	7	100	62.5	288.0	Fixed
20	81017	PTK Post Gen. Jnl. Entry 4PS		Inrichtingsbedrijfs ██████	300	50	54	9	13,137	8210.5	120.0	Fixed
21	81027	PTK Open Vend Open Entries		Inrichtingsbedrijfs ██████	300	30	32	5	52	32.3	557.3	Fixed
22	81028	PTK Open Cust Open Entries		Inrichtingsbedrijfs ██████	300	50	54	9	631	394.4	120.0	Fixed
23	81036	PTK Add&Post Sales Inv. 4PS		Inrichtingsbedrijfs ██████	300	40	43	7	13,137	8210.5	120.0	Fixed
24	81030	PTK Open Post. Sales Inv. 4PS		Inrichtingsbedrijfs ██████	300	60	64	10	1314	821.1	120.0	Fixed
25	81023	PTK Add&Post Time Sheet 4PS		Inrichtingsbedrijfs ██████	300	100	107	17	2	4.0	4500.0	Fixed
50	81003	PTK Create Service Call 4PS		Inrichtingsbedrijfs ██████	300	60	64	10	1000	625.0	120.0	Fixed

Writing test scenario's

- Each test codeunit can exist of multiple scenario's
- Keep it simple
- Use the libraries in the Test Framework

```
1 reference
procedure CreateAndPostPurchaseInvoice()
var
    PurchaseHeader: Record "Purchase Header";
    VendorNo: Code[20];
begin
    if NoOfLinesToCreate < 0 then
        NoOfLinesToCreate := 0;
    if NoOfLinesToCreate > 10000 then
        NoOfLinesToCreate := 10000;

    //Find a random vendor
    VendorNo := SelectRandomVendor();

    BCPTTestContext.StartScenario('Create Purchase Invoice');
    CreatePurchaseInvoiceForVendorNo(PurchaseHeader, VendorNo);
    BCPTTestContext.EndScenario('Create Purchase Invoice');

    BCPTTestContext.StartScenario('Post Purchase Invoice');
    CODEUNIT.Run(CODEUNIT::"Purch.-Post (Yes/No)", PurchaseHeader);
    BCPTTestContext.EndScenario('Post Purchase Invoice');
end;
```

```
1 reference
local procedure SelectRandomVendor(): Code[20]
var
    Vendor: Record Vendor;
begin
    Vendor.SetRange(Blocked, Vendor.Blocked::" ");
    Vendor.Next(SessionId() MOD Vendor.Count());
    exit(Vendor."No.");
end;
```

Starting the test

- Use always a warmup test
- PowerShell script
 - Also for CI/CD
- VS Code for developers

Test URL: <https://dockeragent06.4ps.nl/perftester>

The passed path for `-BCPTTestRunnerInternalFolderPath` seem to be relative. Absolute path is `C:\bcartifacts.cache\onprem\20.1.39764.39901\platform`.
Importing AL Test Runner from `C:\bcartifacts.cache\onprem\20.1.39764.39901\platform`.
WARNING: The names of some imported commands from the module 'ALTestRunner' may not make them less discoverable. To find the commands with unapproved verbs, use the `Get-Verb` cmdlet. For a list of approved verbs, type `Get-Verb`.

Id	Name	PSJobTypeName	State	HasMoreData
--	----	-----	----	-----
8	Job8	BackgroundJob	Running	True
10	Job10	BackgroundJob	Running	True
12	Job12	BackgroundJob	Running	True
14	Job14	BackgroundJob	Running	True
16	Job16	BackgroundJob	Running	True
18	Job18	BackgroundJob	Running	True
20	Job20	BackgroundJob	Running	True
22	Job22	BackgroundJob	Running	True
24	Job24	BackgroundJob	Running	True
26	Job26	BackgroundJob	Running	True
28	Job28	BackgroundJob	Running	True
30	Job30	BackgroundJob	Running	True
32	Job32	BackgroundJob	Running	True
34	Job34	BackgroundJob	Running	True
36	Job36	BackgroundJob	Running	True
38	Job38	BackgroundJob	Running	True
40	Job40	BackgroundJob	Running	True
42	Job42	BackgroundJob	Running	True
44	Job44	BackgroundJob	Running	True
46	Job46	BackgroundJob	Running	True
48	Job48	BackgroundJob	Running	True
50	Job50	BackgroundJob	Running	True

Starting the test - PowerShell

- PowerShell to simulate multiple users
- For BC Online create an “App registration”

```
##Standard BC
$Credential = New-Object PSCredential -ArgumentList '<user>@<domain>',
(ConvertTo-SecureString -String '<password>' -AsPlainText -Force)
C:\Users\bverbeek\Documents\AL\TestRunner\RunBCPTTests.ps1
-ClientId dd52e8d1-d969-414f-8ce2-26ed233ba75c
-Environment DOC -AuthorizationType AAD
-Credential $Credential
-TestRunnerPage 149002
-SuiteCode 01
-BCPTTestRunnerInternalFolderPath
C:\Users\bverbeek\Documents\AL\TestRunner\Internal
-SandboxName bc22
```

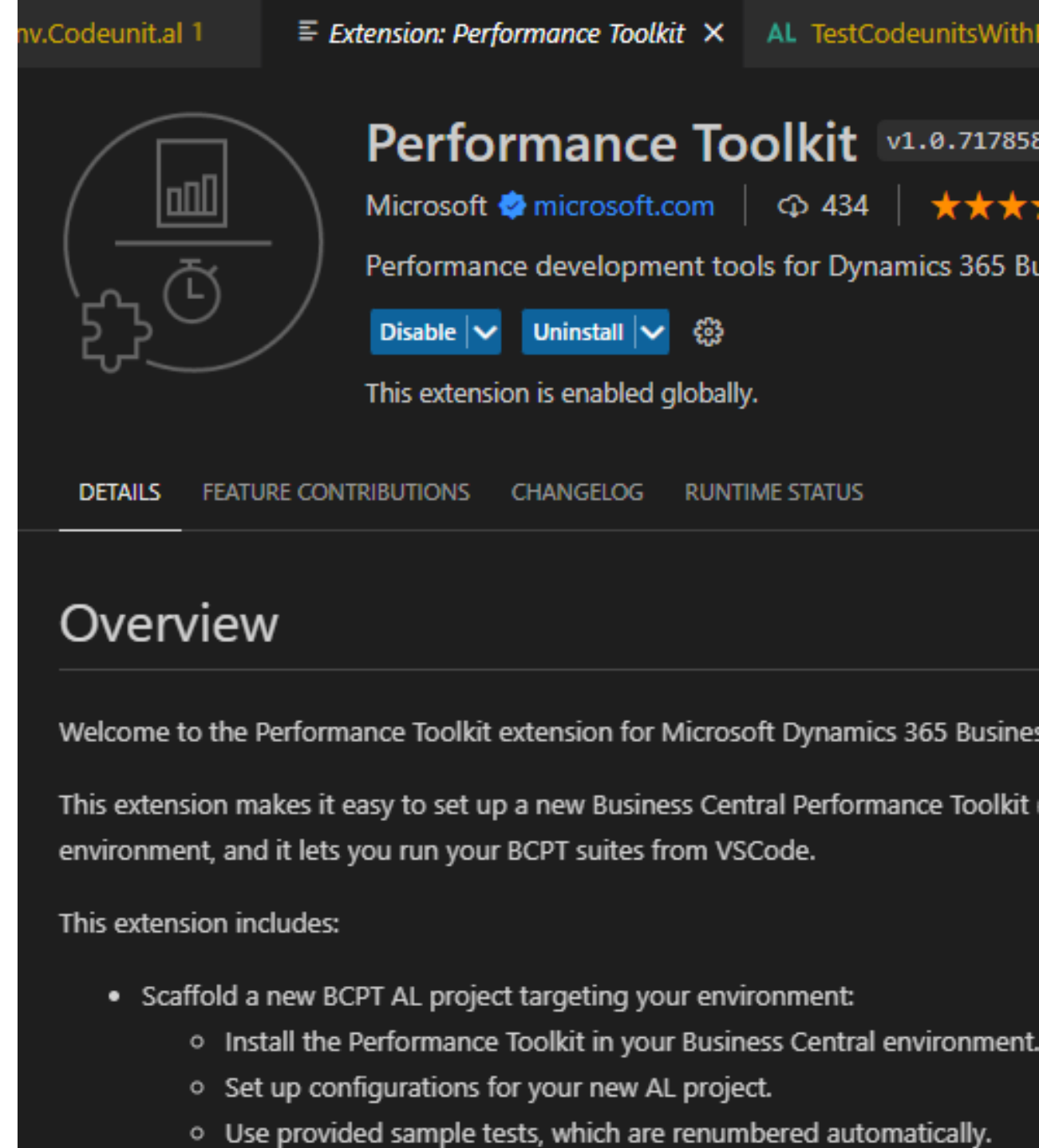
```
## Container
$Credential = New-Object PSCredential '<loginname>',(ConvertTo-
SecureString -String '<password>' -AsPlainText -Force)
C:\Users\bverbeek\Documents\AL\TestRunner\RunBCPTTests.ps1
-Environment OnPrem
-AuthorizationType NavUserPassword
-Credential $Credential
-TestRunnerPage 149002
-SuiteCode TEST
-BCPTTestRunnerInternalFolderPath
C:\Users\bverbeek\Documents\AL\TestRunner\Internal
-ServiceUrl https://NextMajor/BC/?tenant=default
```

+ Add a permission ✓ Grant admin consent for Contoso

API / Permissions name	Type	Description	Admin consent req...	Status
▼ Dynamics 365 Business Central (1)				
Financials.ReadWrite.All	Delegated	Access Dynamics 365 Business Central as the signed-in...	No	✓ Granted for Contoso

VS Code extension

- Setup New Business Central Performance Toolkit Project
- Run BCPT (PowerShell)

A screenshot of the Visual Studio Code extension marketplace page for the 'Performance Toolkit' by Microsoft. The page shows the extension's icon, name, version (v1.0.717858), publisher (Microsoft), and a 4-star rating. It also includes buttons for 'Disable' and 'Uninstall', and a note that the extension is enabled globally. The 'Overview' section is visible, providing a welcome message and a description of the extension's purpose: to facilitate setting up a new Business Central Performance Toolkit environment and running BCPT suites from VS Code. A list of features is partially visible, starting with 'Scaffold a new BCPT AL project targeting your environment:'.

nv.Codeunit.al 1 Extension: Performance Toolkit AL TestCodeunitsWith

Performance Toolkit

Microsoft microsoft.com | 434 | ★★★★★

Performance development tools for Dynamics 365 Bu

Disable | Uninstall | ⚙️

This extension is enabled globally.

DETAILS FEATURE CONTRIBUTIONS CHANGELOG RUNTIME STATUS

Overview

Welcome to the Performance Toolkit extension for Microsoft Dynamics 365 Business Central.

This extension makes it easy to set up a new Business Central Performance Toolkit environment, and it lets you run your BCPT suites from VSCode.

This extension includes:

- Scaffold a new BCPT AL project targeting your environment:
 - Install the Performance Toolkit in your Business Central environment.
 - Set up configurations for your new AL project.
 - Use provided sample tests, which are renumbered automatically.

Start | Start in Single Run mode | Stop | Refresh | Log Entries | More options

Code	TEST_DOC	1 Work Day Corresponds to (minutes)	10
Description	Test VS Code	Version	1
Tag		Base Version	0
Duration (minutes)	1	Status	Completed
Default Min. User Delay (ms)	100	Started at	5/17/2023 1:44 PM
Default Max. User Delay (ms)	1000	Total No. of Sessions	2
Work date starts at	4/10/2023		

BCPT Suite Lines | New | Start this line in foreground | New Line | Delete Line

Codeunit ID	Codeunit Name	Parameters	No. of Sessions	Run in For...	Description	Status	Min. User Delay (ms)	Max. User Delay (ms)	Delay between iterations (sec.)
50007	BCPT Open Item List		3	<input checked="" type="checkbox"/>		Completed	100	1000	5
→ 50011	BCPT Open Vendor List		2	<input checked="" type="checkbox"/>		Completed	100	1000	5
50005	BCPT Open Chart of Accounts		3	<input checked="" type="checkbox"/>			100	1000	5

Analyze the results

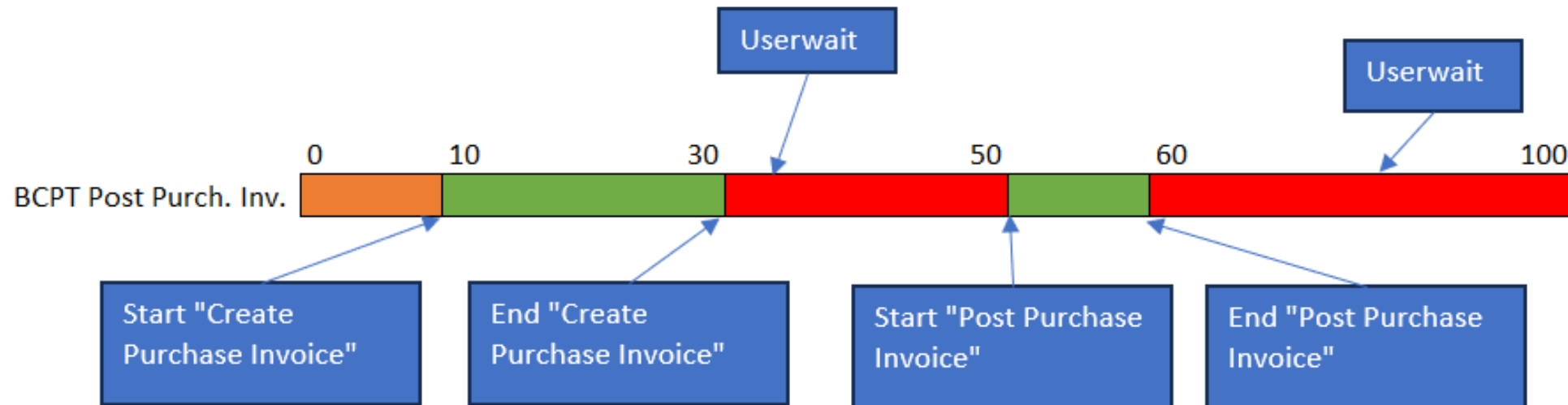
- From inside Business Central
- or export to Excel or use the analyze view



Analyze the results

- Duration (ms) how does it work

Measure	Time
Create Purchase Invoice	20
Post Purchase Invoice	50
Scenario	40



Analyze the results

- Application Insights

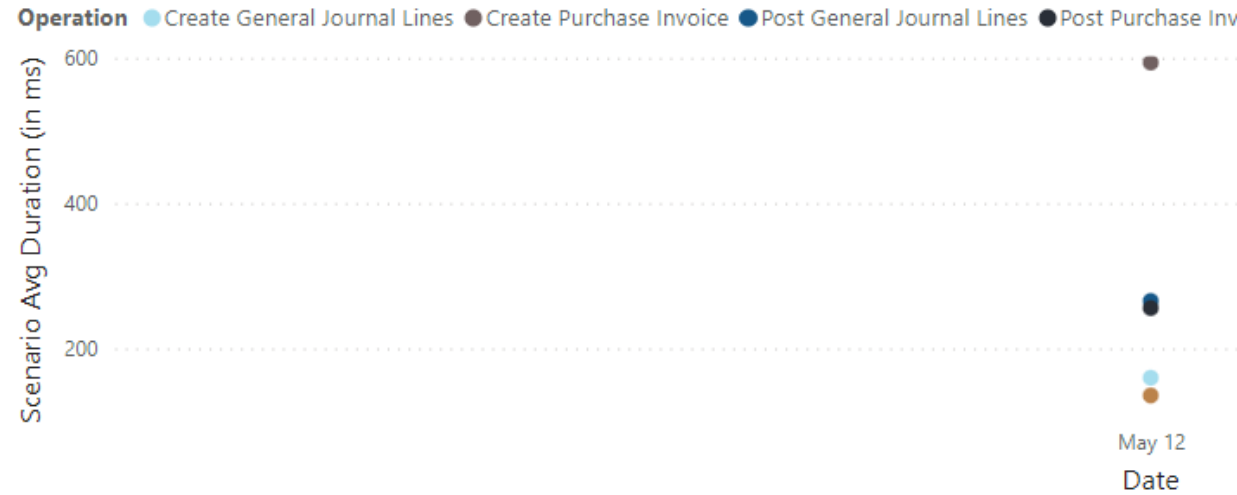
EventId	Message
AL0000DHR	Performance Toolkit run started
AL0000DHS	Performance Toolkit run finished
AL0000DHT	Performance Toolkit run cancelled
AL0000DGF	Performance Toolkit - {BCPT Header code} - {BCPT Scenario code} - {BCPT Line status}

- Power BI report

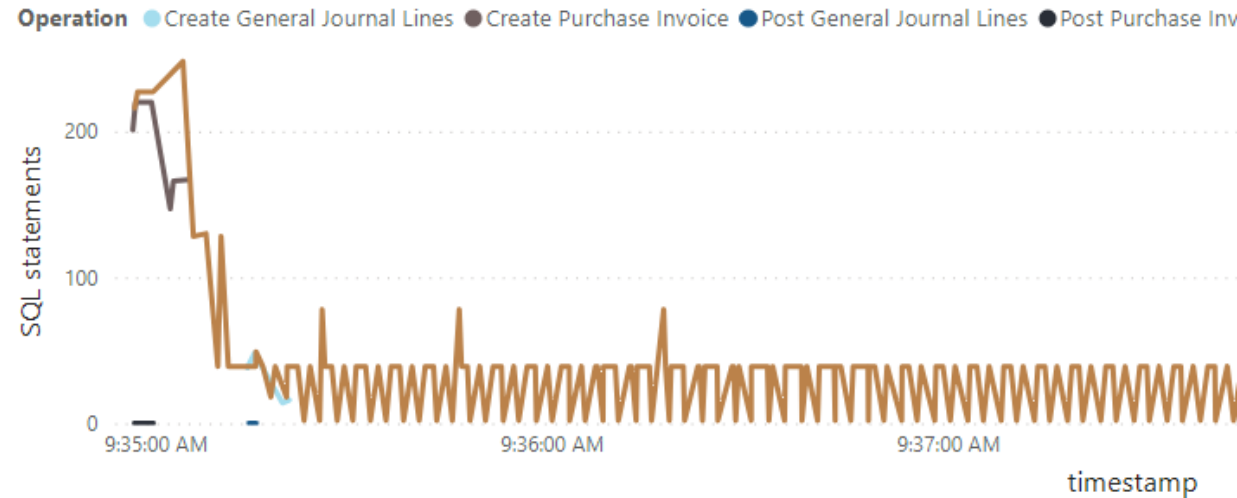


Total

Scenario Avg Duration (in ms) by Date and Operation



SQL statements by timestamp and Operation



Analyze further with KQL

Open in Application Insights (if you have set parameters) KQL Query (if you want to copy it)

// change lookback limit as needed

Call to action

- Visit:
[Performance Toolkit Extension – Microsoft Learn](#)
- Contribute to test samples
[BCPT-SampleTests · microsoft/ALAppExtensions · GitHub](#)

Thank you!

