Microsoft Dynamics 365

What's new in Server and Database

Agenda

- a faster runtime
- a faster data stack
- more stable web services
- new reporting capabilities

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A faster runtime

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ErrorInfo and Notifications

In ErrorInfo datatype

- AddAction now supports tooltips
- AddAction now checks if you try to call an on-premises function

  Action will not be added if not allowed

Source code example: ErrorInfo in Approvals Mgmt.

```
ErrInfo.AddAction( RejectApprovalRequestLbl
, Codeunit::"Approvals Mgmt.“
, 'RejectApprovalRequest’
, RejectApprovalRequestToolTipLbl
);


ErrInfo.AddAction( ShowCommentsLbl
, Codeunit::"Approvals Mgmt.“
, 'ShowApprovalCommentLinesForJournal’
, ShowCommentsToolTipLbl
);
```

This may also affect you

SecretText type

- See other *What's new in AL* session

Effective Permissions page shows permissions from Security Groups

Navigate to Query in client

Open query URL:

/?query=<query object id>

New: *Analysis* toggle button – opens new UI

New: Support for RunObject

Runobject on a query

```
pageextension 50110 ItemListWithQuery extends "Item List“ {
	actions {
		addbefore("Inventory - List") {
			action("Analyze items") {
				ApplicationArea = All;
				Caption = 'Analyze Item ledger’;
				RunObject = query "Item hero query";
				Tooltip = Analyze further’;
				Image = Item;
			}
		}
	}
}
```

Long running AL telemetry now handles suspended time

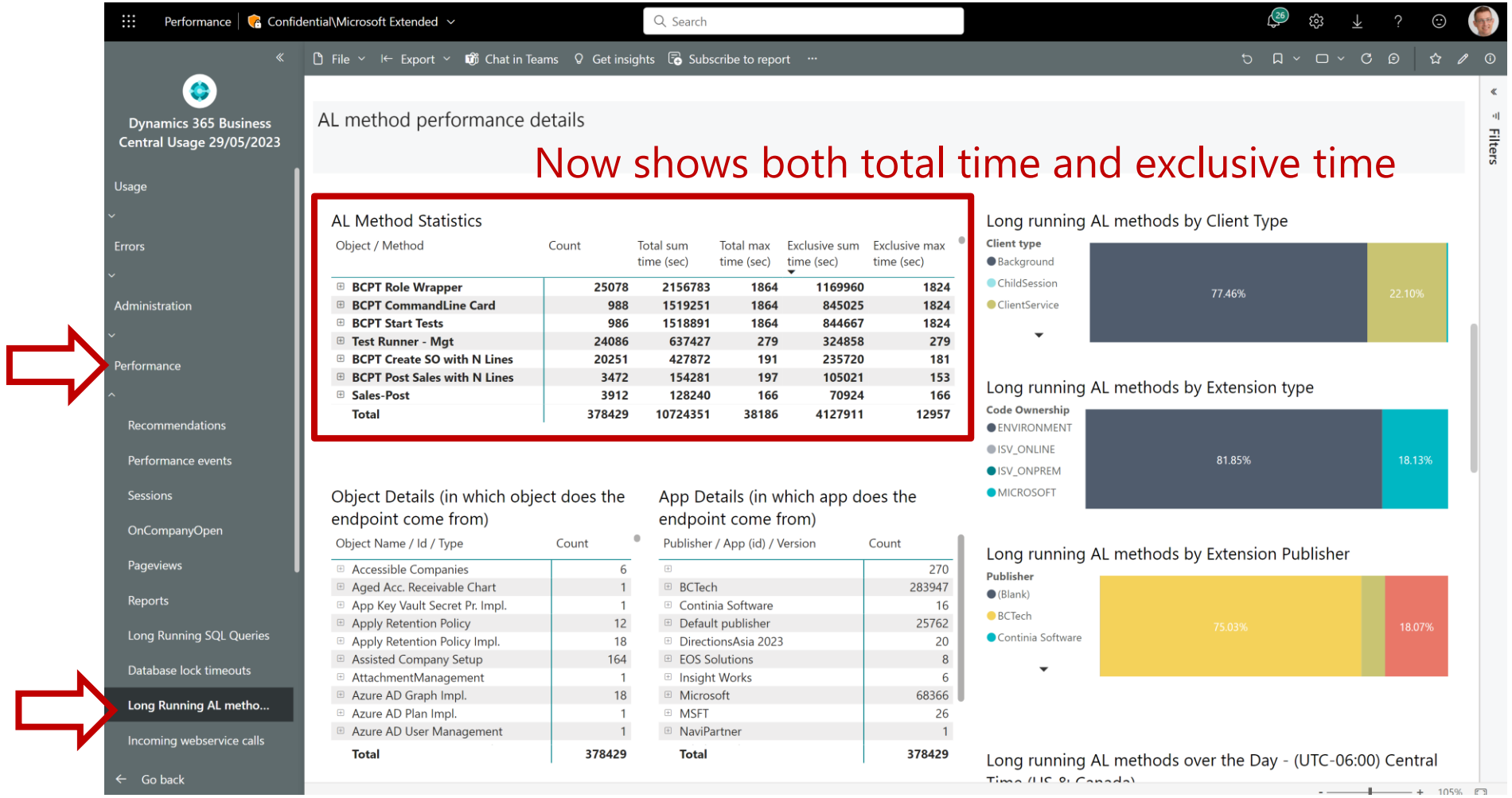
Partners feedback: event RT0018 does not provide value since it included time spent in modal events.

Therefore, we now also calculate the time excluding the time in modal events.

New dimension - exclusiveTime

```
| where customDimensions.eventId == 'RT0018'
| where customDimensions.alObjectId > 0 // filter out internal server calls
| project aadTenantId = customDimensions.aadTenantId
, environmentName = customDimensions.environmentName
, environmentType = customDimensions.environmentType
, companyName = customDimensions.companyName
, alMethod = customDimensions.alMethod
, alObjectId = customDimensions.alObjectId
, alObjectName = customDimensions.alObjectName
, alObjectType = customDimensions.alObjectType
, alStackTrace = customDimensions.alStackTrace // use the KQL snippet parseStackTrace to get top/bottom of the stack trace details
, clientType = customDimensions.clientType
, exclusiveTime = customDimensions.exclusiveTime // This dimension was introduced in Business Central 2023 release wave 1, version 22.1. Backported to version 21.6
, exclusiveTimeInMS = toreal(totimespan(customDimensions.exclusiveTime))/10000 //the datatype for exclusiveTime is timespan
, executionTime = customDimensions.executionTime
, executionTimeInMS = toreal(totimespan(customDimensions.executionTime))/10000 //the datatype for executionTime is timespan
, extensionId = customDimensions.extensionId
, extensionInfo = customDimensions.extensionInfo // parse this json structure to find out if other extensions is involved
, extensionName = customDimensions.extensionName
, extensionPublisher = customDimensions.extensionPublisher
, extensionVersion = customDimensions.extensionVersion
, longRunningThreshold = customDimensions.longRunningThreshold
, longRunningThresholdInMS = toreal(totimespan(customDimensions.longRunningThreshold))/10000 //the datatype for executionTime is timespan
, sqlExecutes = customDimensions.sqlExecutes // This dimension was introduced in Business Central 2023 release wave 1, version 22.0
, sqlRowsRead = customDimensions.sqlRowsRead // This dimension was introduced in Business Central 2023 release wave 1, version 22.0
, usertelemetryId = case(
  // user telemetry id was introduced in the platform in version 20.0
```

Long running AL methods – total and exclusive time



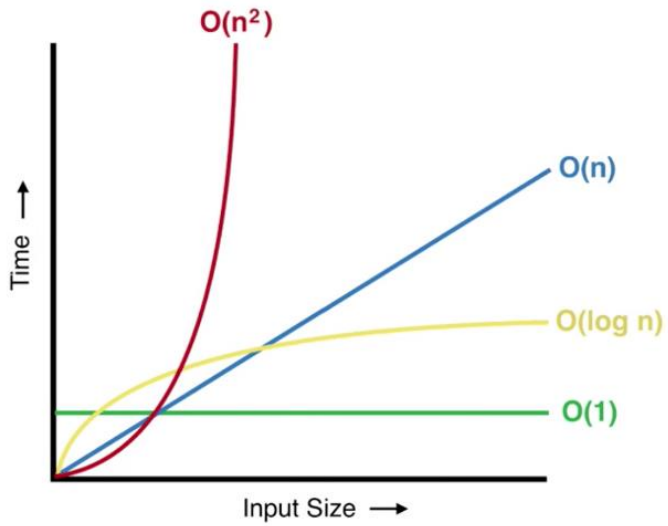
Session creation now 2 ms faster

What: Creating a new session is now 2-4 ms faster

How: Tenant level cache the companies that a user has access to

Fun fact: 5 hours per day for busiest customer

Event initialization optimized



When starting the NST, we need to create event subscribers.

Event subscription creation is now 1000x faster (for 1000 events), going from quadratic to linear growth.

Also, lower memory consumption.

Go dos

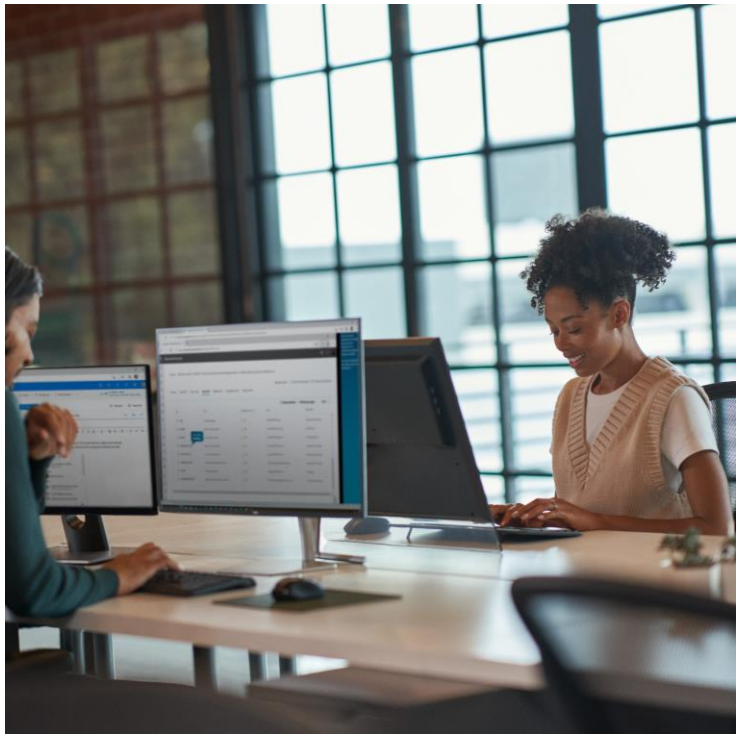
Stop using old Error method

- Use the new one that uses ErrorInfo

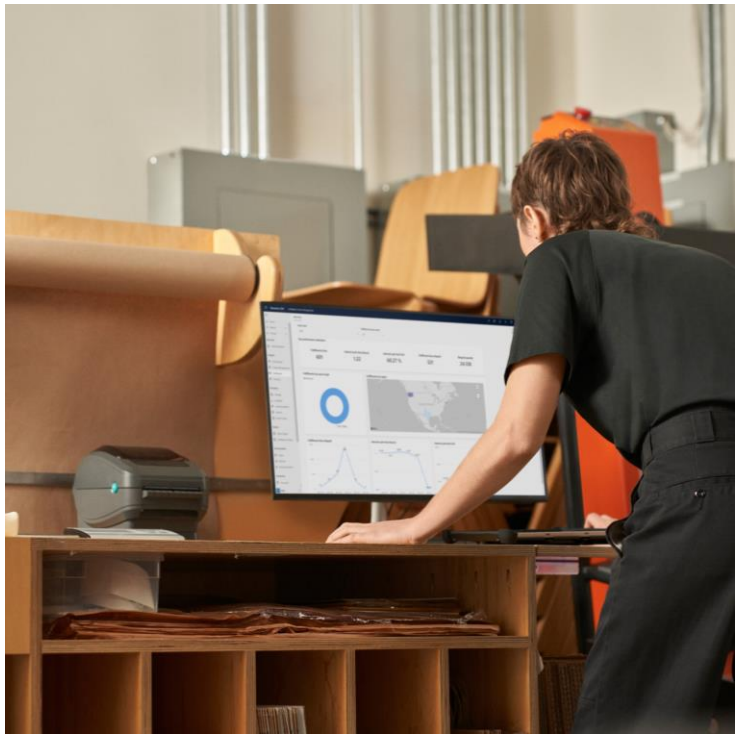
Harden your AL code

- Start using SecretText where approriate

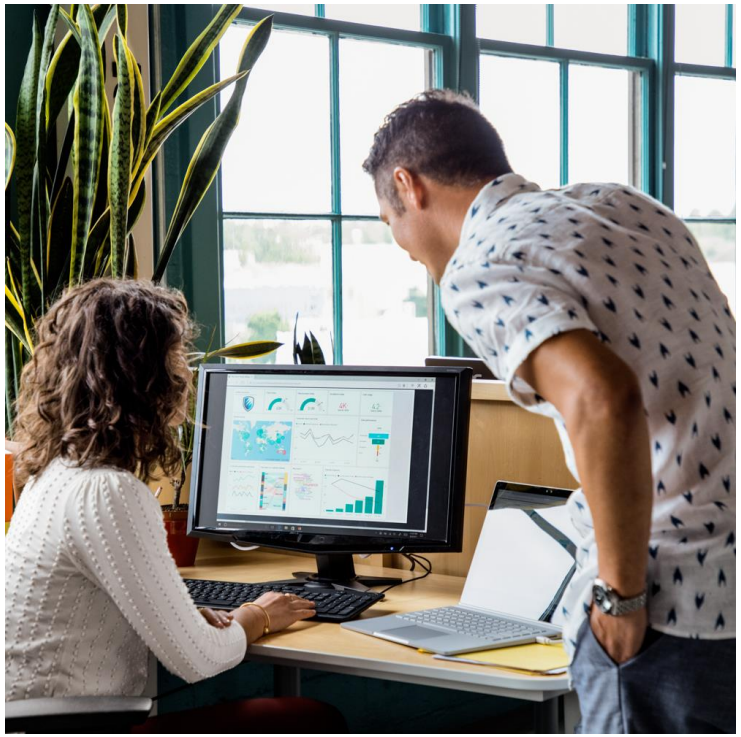
Watch other relevant launch event sessions



What's new: Developer tools



What's new: Dataverse & Dynamics 365 app integration - Part 2



What's new: Telemetry

General Business Central resources, learn more!

Have a question?

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Join the conversation

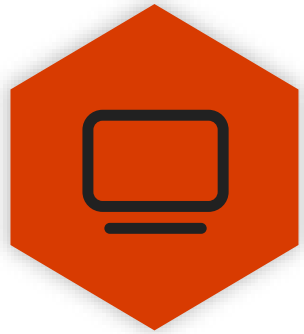
twitter.com/MSDyn365BC

Looking for resources?

aka.ms/BCAll

Submit your ideas

aka.ms/BCIdeas



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Thank you

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What's new in Server and Database

A faster data stack

Agenda

- a faster runtime
- **a faster data stack**
- more stable web services
- new reporting capabilities

How companion tables work in version 22 (and earlier)

Each table extension has data *in its own table*.
Runtime enforces a 1:1 relationship.
Primary key of base table is also PK for all companion tables.

Fetching data requires joining with *all extension tables*

- Execution time grows linearly with number of extensions
- SQL Server often ‘gives up optimizing’ when you have 8+ joins
- You can opt out of joining using *partial records*

Behaviour of previous data model

N-way join of 1-1 tables is slow.

No particular app/extension is to blame.

Cannot ask customers to uninstall functionality.

Only platform can solve the problem (so we did!).

New data model for table extensions

Minimizes use of joins when working with table extensions.

Delete performance (2x-5x faster)

Insert performance (2x faster)

Modify performance (1,5x-2,5x faster)

Read performance (faster, but NST caches data)

Extension schema in version 22 and earlier

dbo.MyCompany$TableName$<baseAppGuid>

PK1	Field1	Field2	$systemId	$<audit fields>	rowVersion
V22	2023	Wave1	<guid1>	...	Xxxxxxxx
V23	2023	Wave2	<guid2>	...	Yyyyyyyy

dbo.MyCompany$TableName$<Guid1>

PK1	YellowField	rowVersion
V22	Fast	Zzzzzzzz1
V23	Faster	Zzzzzzzz2

dbo.MyCompany$TableName$<Guid2>

PK1	RedField	rowVersion
V22	ReadIsolation	Wwwwww1
V23	New tooltips	Wwwwww2

Extension schema in version 23

dbo.MyCompany$TableName$<baseAppGuid>

PK1	Field1	Field2	$systemId	$<audit fields>	rowVersion
V22	2023	Wave1	<guid1>	…	Xxxxxxxx
V23	2023	Wave2	<guid2>	…	Yyyyyyyy

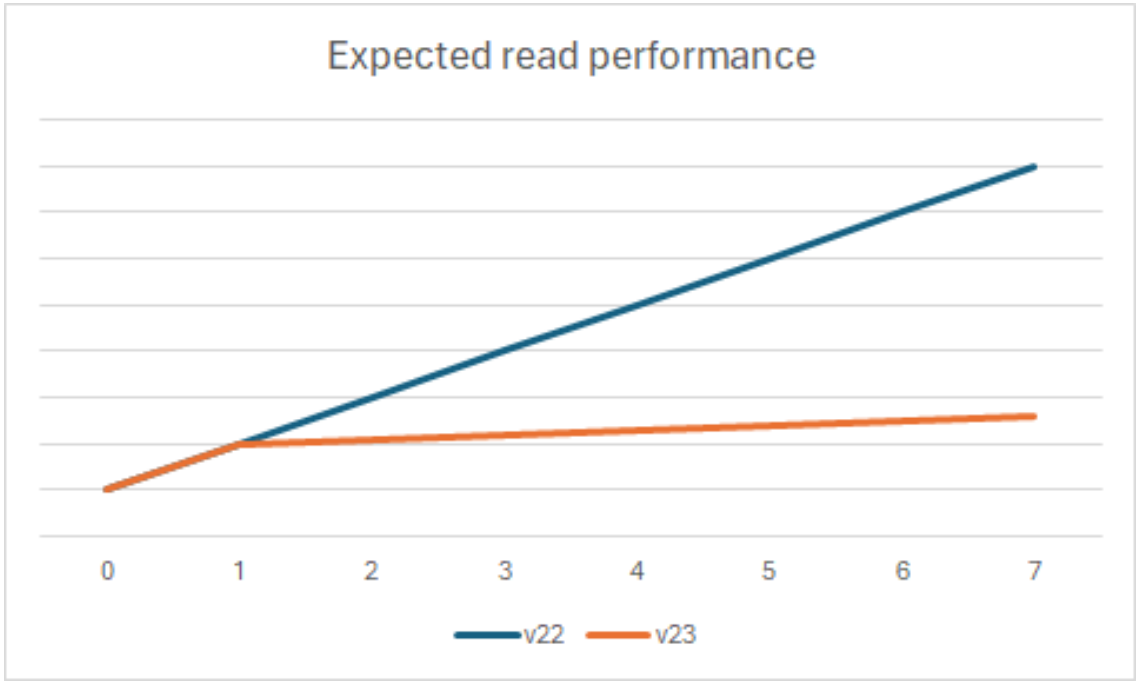
dbo.MyCompany$TableName$<baseAppGuid>$ext

PK1	YellowField$Guid1	RedField$Guid2	rowVersion
V22	Fast	ReadIsolation	Vvvvvvvv1
V23	Faster	New tooltips	Vvvvvvvv2

Expected performance impact

Main improvement: read performance

- At most 1 join
- No triggers to run
- After 1st join, duration only depends on data size



Modify/Insert/Delete

- Harder to do in bulk
- Often determined by triggers / events

Mileage will vary

- Field counts and sizes
- Trigger code
- Indexes

Cloud migration and new table schema

Cloud migration relies on SQL schema + system tables.

Version 23 exposes the mapping from previous versions.

Updates to the cloud migration tool (ADF flows) have been shipped.

Cloud migration is fully supported – also from previous versions.

But we have data warehouse/business intelligence on-premises that read directly on the database

Mimic the old schema with database views.

Find code samples on Github.

Is SetLoadFields still need? YES!

Removing JOIN statements

- Can still remove the one remaining JOIN statement

Limits fields loaded

- Less data to transfer and cache
- Ability to hit covering index

So: continue using SetLoadFields

- Find performance critical code
- Create covering indexes

New method

SetBase LoadFields

SetBaseLoadFields adds all fields from base table to loaded fields

Developers are lazy (this is a good thing).

Lower maintenance cost if making changes later.

SetBaseLoadFields

```
VATEntry.Reset();
VATEntry.SetBaseLoadFields();
VATEntry.SetRange("Transaction No.", GLEntry."Transaction No.");
VATEntry.SetRange("VAT Bus. Posting Group", GLEntry."VAT Bus. Pos
ting Group");
VATEntry.SetRange("VAT Prod. Posting Group", GLEntry."VAT Prod. P
osting Group");

if VATEntry.FindSet() then begin
// code continues here
```

Key takeaways on new extension schema

No action required on partners

Performance improvements with 2+ extensions

- Mainly on read performance
- Results will vary based on extension count, field sizes and indexes

Cloud migration fully supported

Only on-premises: Work to do for solutions accessing SQL tables directly.

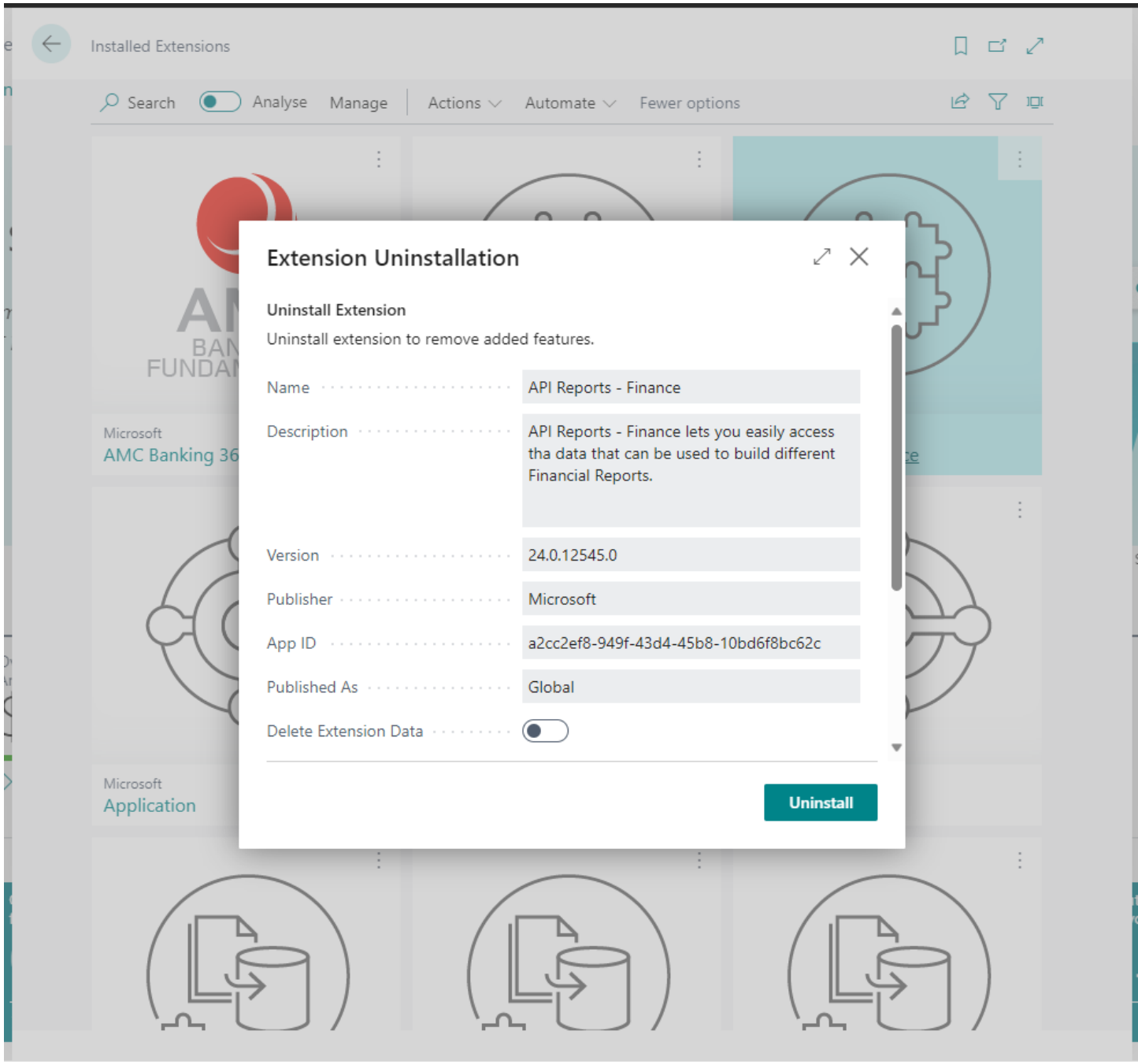
Deleting data from orphaned extensions

Admins can delete data from un-installed extensions.

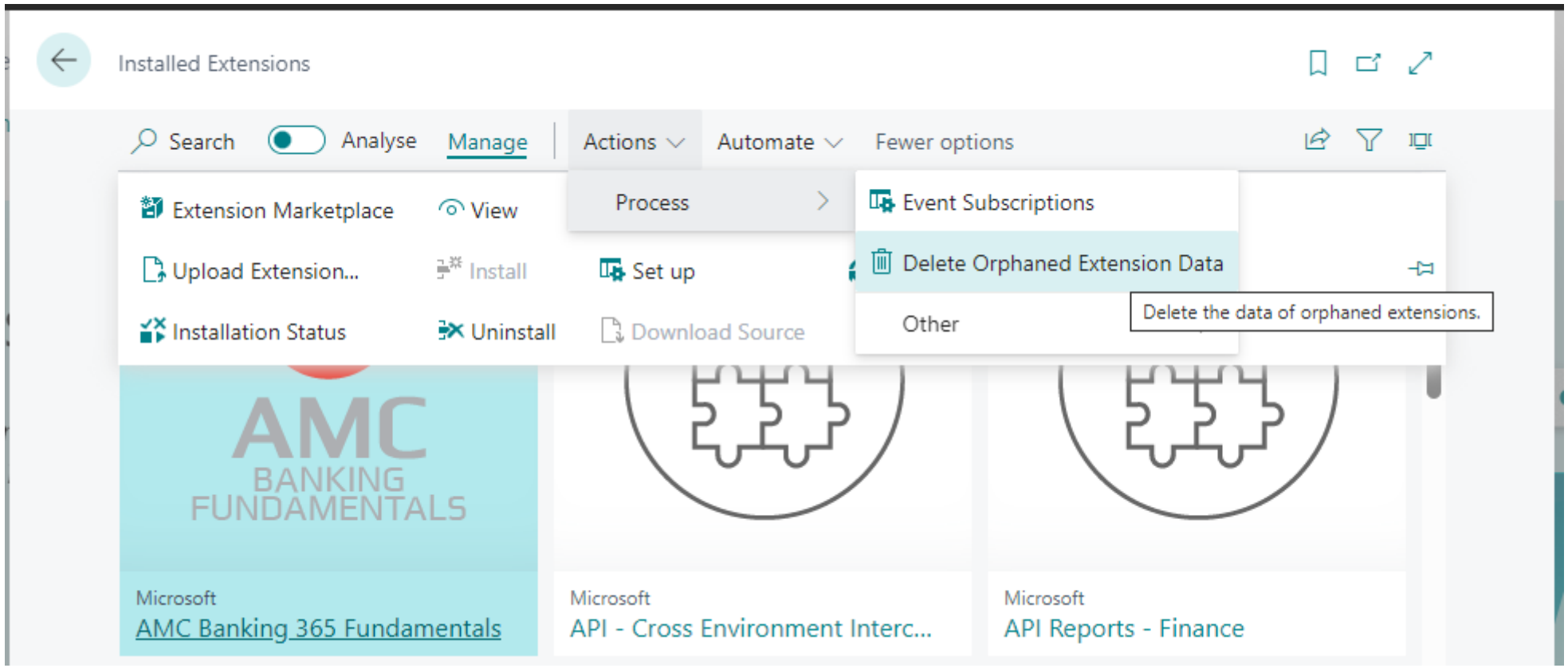
Frees up database capacity.

Reduces row size in the extension table.

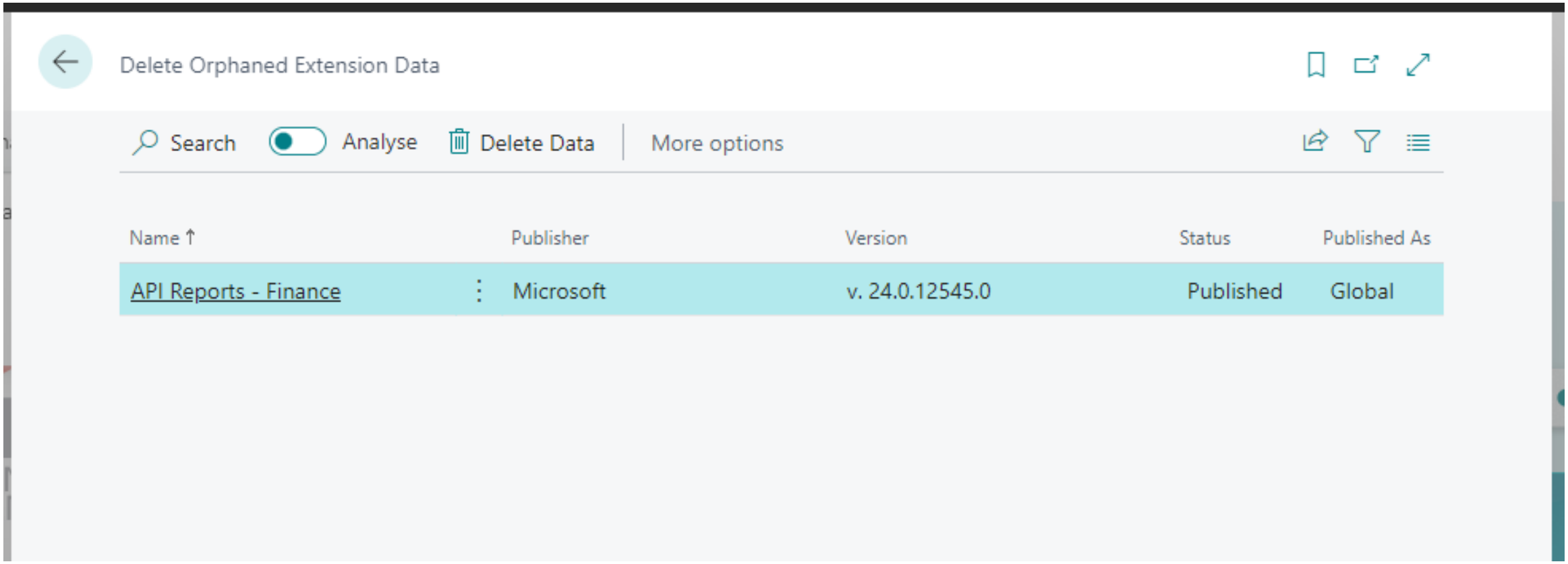
If you forget to mark “Delete Extension Data”



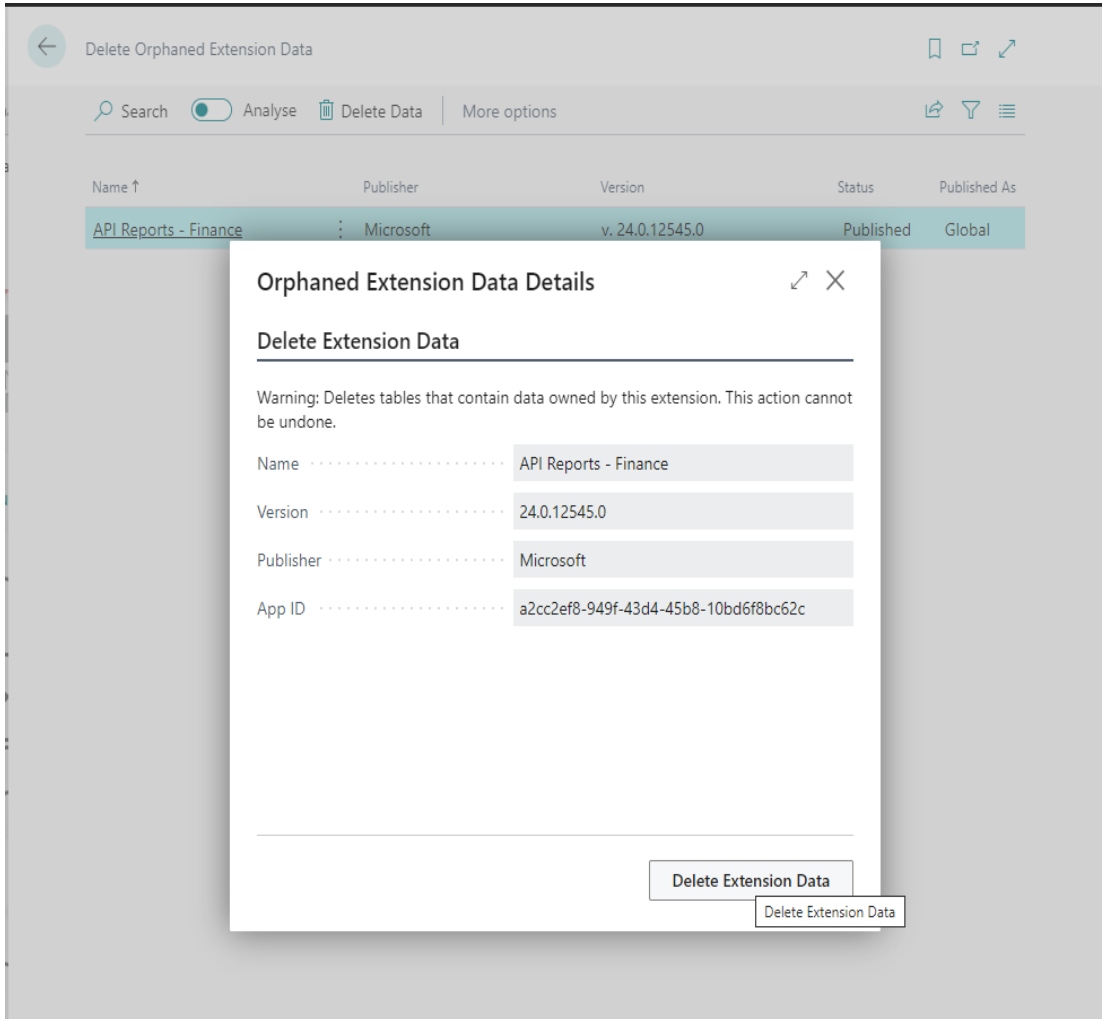
Deleting data from orphaned extensions



Find the orphaned extension here



Deleting data from orphaned extensions – and delete the data



New locking model

Minimizes use of database locks in AL.

Benefits all usage scenarios: web service integrations, background jobs, and interactive sessions.

Improves throughput and responsiveness of the service and reduces likelihood of deadlocks and lock timeouts.

Example - before

```
trigger OnAction()
var
    curr1: Record Currency;
    curr2: Record Currency;
begin
    curr1.FindFirst(); // READUNCOMMITTED

    curr1.Code := 'BTC';
    curr1."ISO Code" := 'XBT';
    curr1.Symbol := '฿';
    curr1.Insert();

    curr2.FindLast(); // UPDLOCK
end;
```

Example – with new locking enabled

```
trigger OnAction()
var
    curr1: Record Currency;
    curr2: Record Currency;
begin
    curr1.FindFirst(); // READUNCOMMITTED

    curr1.Code := 'BTC';
    curr1."ISO Code" := 'XBT';
    curr1.Symbol := '฿';
    curr1.Insert();

    curr2.FindLast(); // READCOMMITTED
end;
```

New locking model – for a given record type

No writes or LockTable done to record type in current transaction	All reads have the READUNCOMMITTED hint applied
Data has been written to the record type in current transaction	Further reads will have the READCOMMITTED hint applied
If LockTable has been called on the record type in the current transaction	Further reads will have the UPDLOCK hint applied

Data written to the record type in current transaction

Before

- Default locking behavior was UpdLock.
- Session would acquire update lock on data from the table until it committed or rolled back its changes.
- Could cause blocking and contention issues when multiple sessions tried to access or modify the same table.

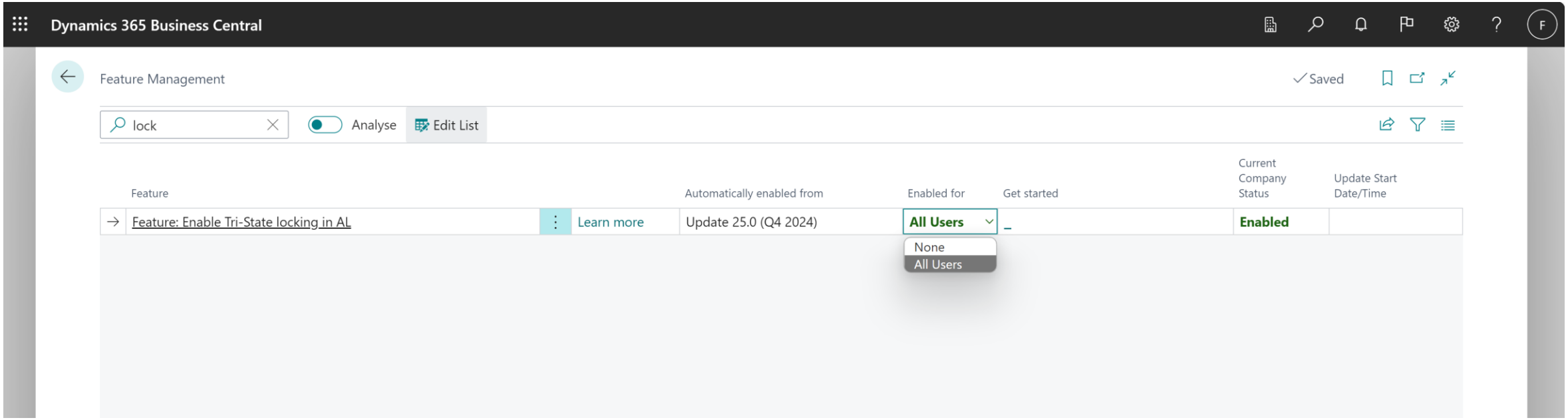
New locking

- Default locking behavior is ReadCommitted
- Session will only acquire a shared lock when reading data.
- Allows other sessions to read and write to the same table concurrently, if they do not conflict with each other's changes.

New locking behavior can be turned on/off

Go to the Feature Management page

Tip! Enable in sandboxes and run (BCPT?) tests



New locking: Rollout

- Version 23 (2023 release wave 2)
  - Upgraded tenants: Opt-in via Feature Key.
  - New tenants: Already enabled.
  - Both can enable and disable at will.

- Version 24 (2024 release wave 1)
  - All tenants: Enabled by default.
  - Both can enable and disable at will.

- Version 25 (2024 release wave 2)
  - New locking is the only way.

Data stack performance improvements

Optimization: Faster inserts on tables with Auto-Increment field

Optimization: Faster SetRange(from, to) when to == from

Database changes coming in 2024 release wave 1

Server settings for database hints FORCEORDER and LOOPJOIN (removed)

Removed or Replaced?	Why?
Removed	For Business Central installations on-premises, it is possible to control many server settings. Two of these control the way the Business Central server add hints to SQL statements: DisableQueryHintForceOrder and DisableQueryHintLoopJoin. Starting in version 24, these server settings will no longer be available.

Remove write access to app database tables from AL (removal)

Removed or Replaced?	Why?
Removed	For Business Central on-premises, the main difference between running in single tenancy mode or multi tenancy mode is that in the former, it is possible to write to the app database tables from AL. Starting in version 24, this is no longer possible.

Go dos

Test new locking

- Run BCPT tests with/without new locking.
- Check for errors

Find and delete orphaned data

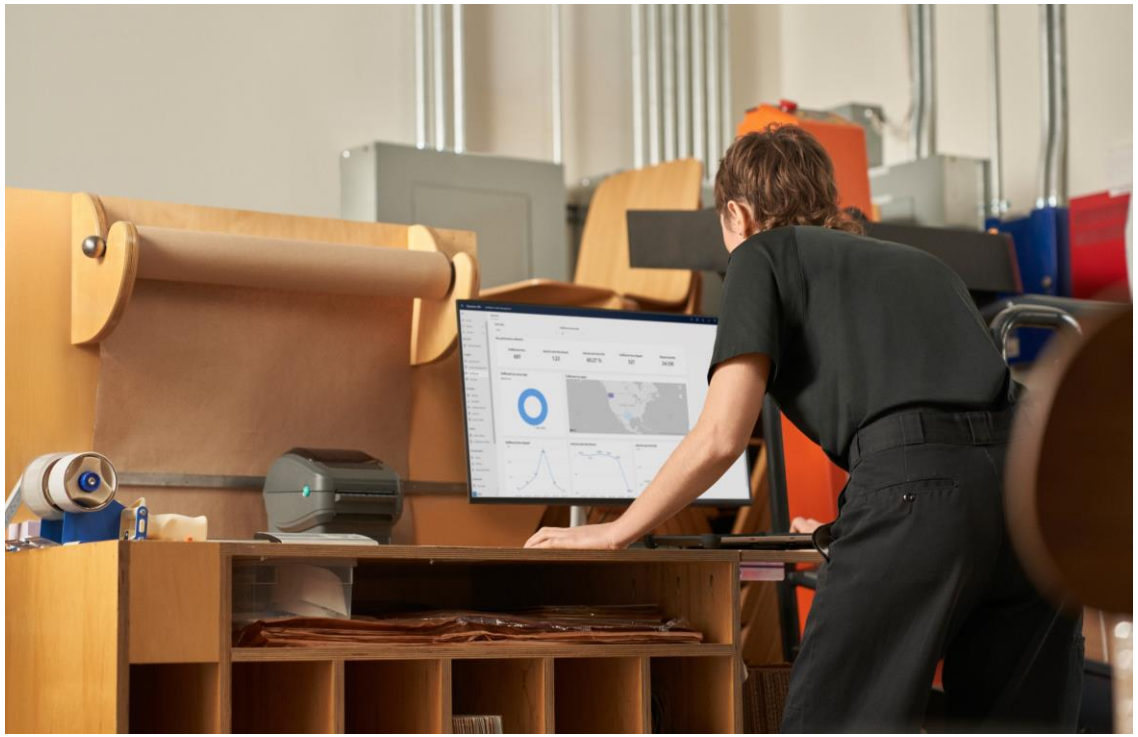
- Save on storage
- Improve performance

Check if you write to app db

- Only for on-premises: if you write to the app database, please stop. In 6 months, this will stop working.

Watch other relevant launch event sessions

What's new: Developer tools



What's new: Server and database - new reporting capabilities

General Business Central resources, learn more!

Have a question?

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Looking for resources?

aka.ms/BCAll

Submit your ideas

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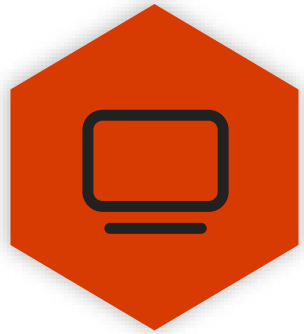

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What's new in Server and Database

More stable web services

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- a faster runtime
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- **more stable web services**
- new reporting capabilities

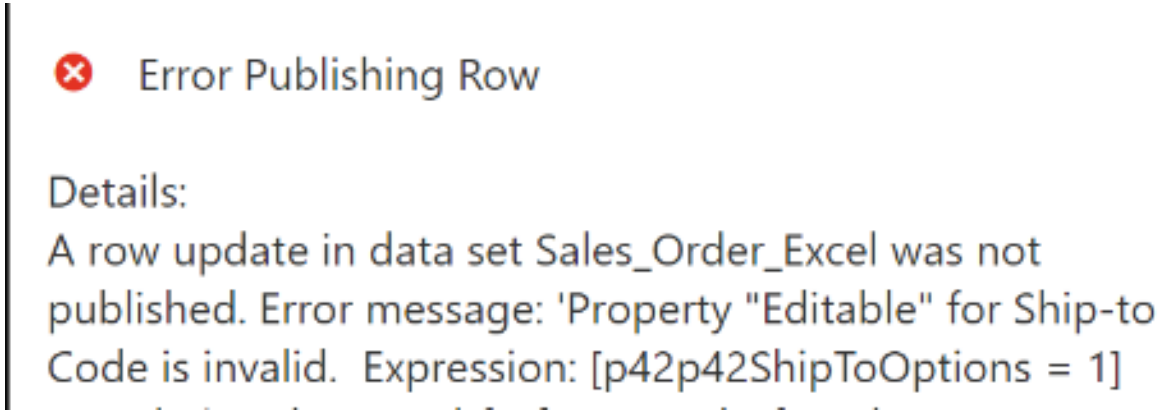
Edit-in-Excel supports more scenarios

ODataV4 pages now evaluate Editable property like the UI does.

Before: only supported Boolean variables.

Example: Ship-to Code on Sales Orders page

```
field("Ship-to Code"; Rec."Ship-to Code")
{
    ApplicationArea = Basic, Suite;
    Caption = 'Code';
    Editable = ShipToOptions = ShipToOptions::"Alternate Shipping Address";
    ...
```



Web service clients can react on timeouts (and reschedule)

If the server is too busy to run webservice requests, resulting in requests waiting in request queue to timeout (timeout is 8 minutes in the request queue), the **server now returns HTTP return code 503** (Service Temporarily Unavailable) along with a retry-after header.

Backported and available from 22.2

Webservice stack more robust towards metadata errors

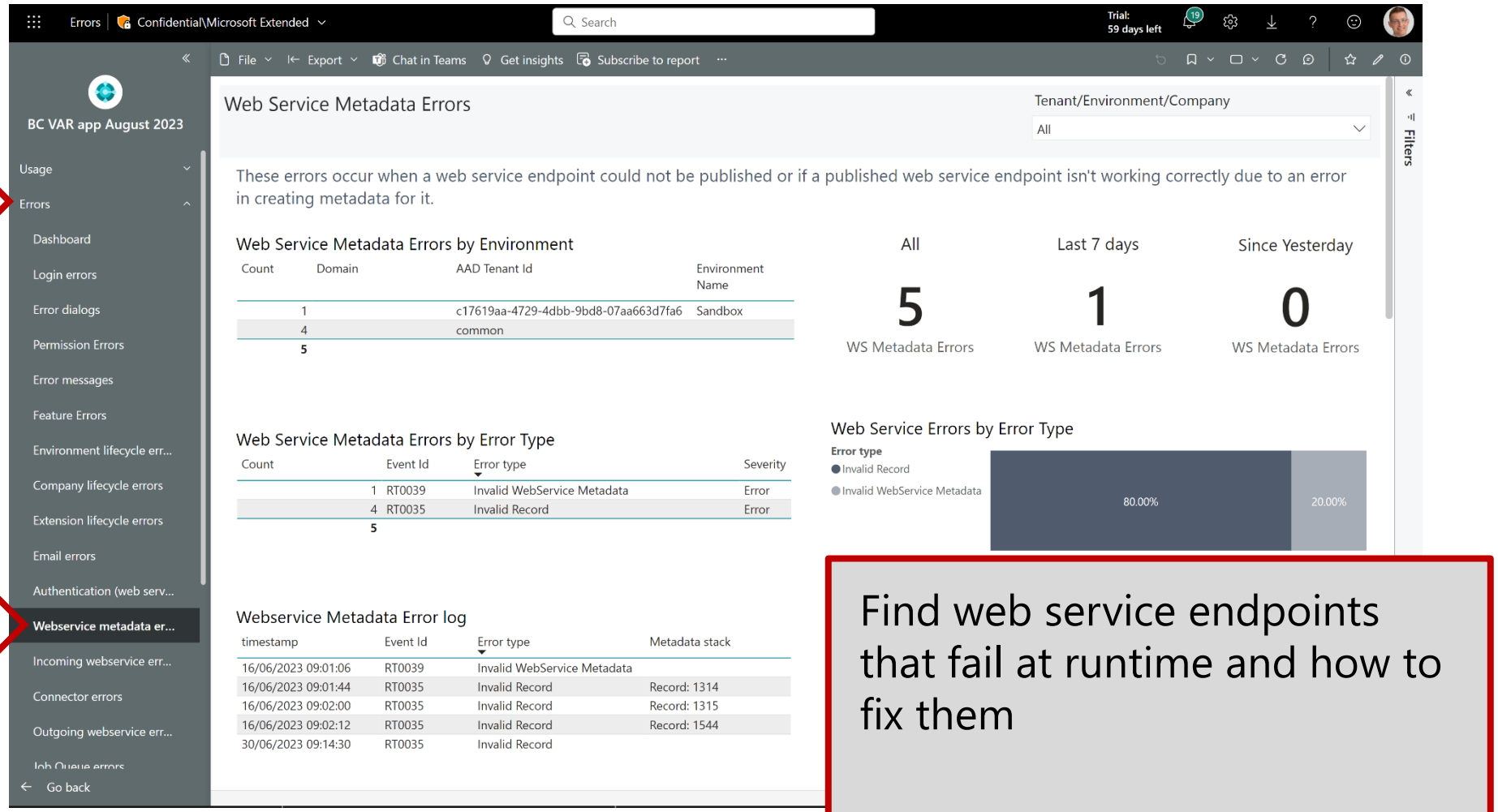
If a single webservice endpoint has metadata errors, what do we do?

Before: all webservice calls would fail

Now: we ignore elements that cause errors and emit partner telemetry.

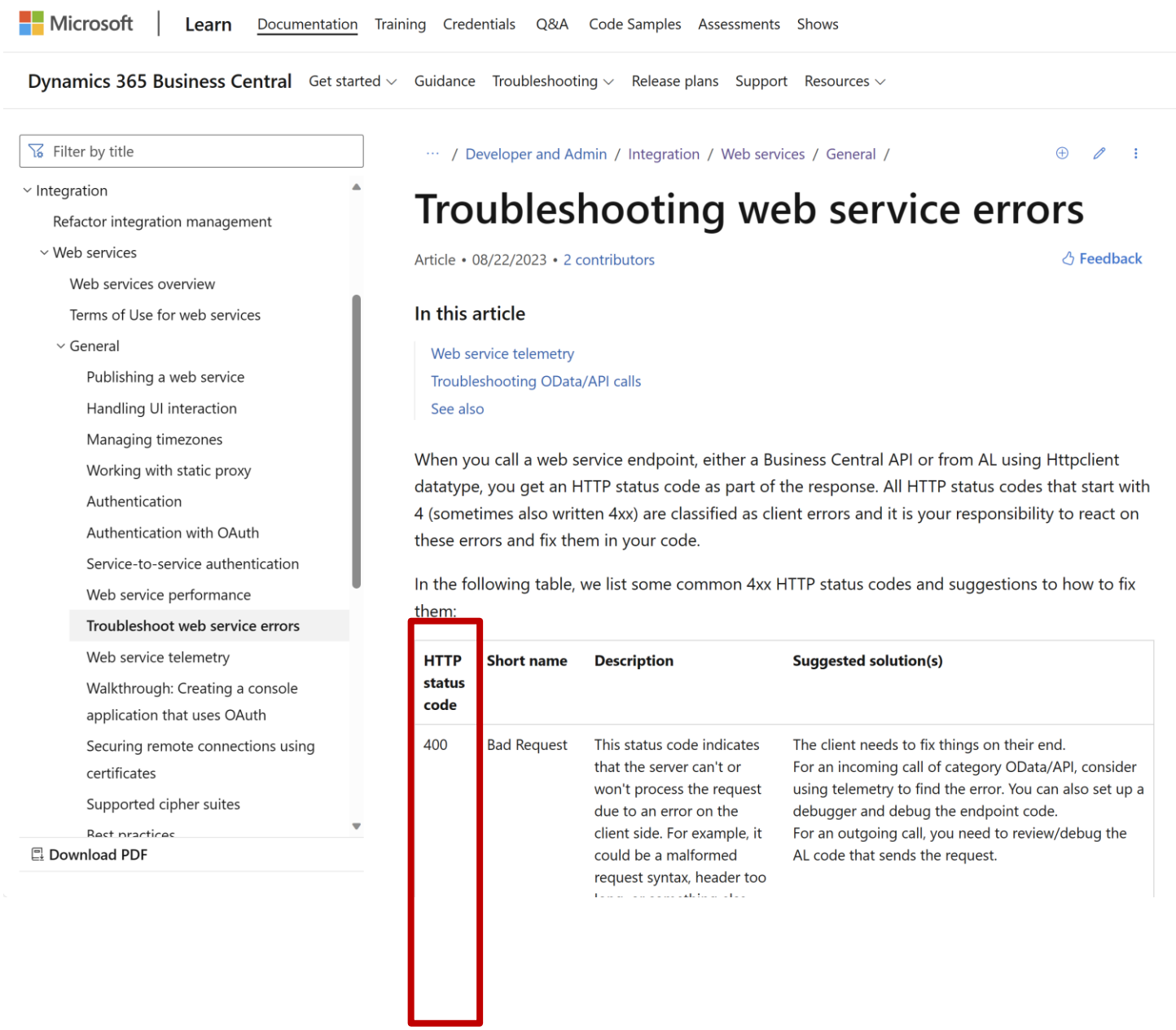
Backported and available from 22.2.

Analyze web service metadata errors in Power BI

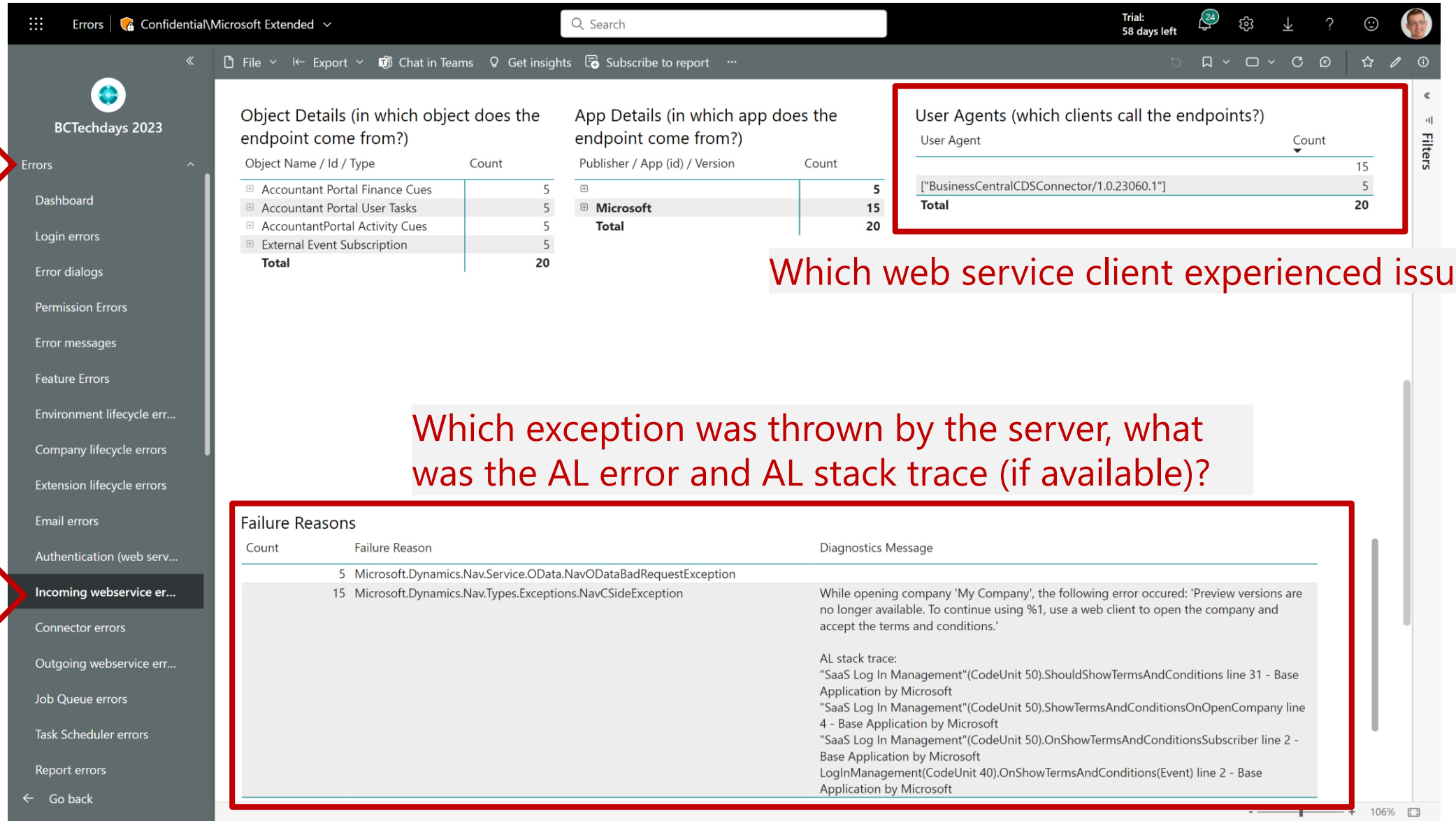


Find web service endpoints that fail at runtime and how to fix them

New TSG in docs

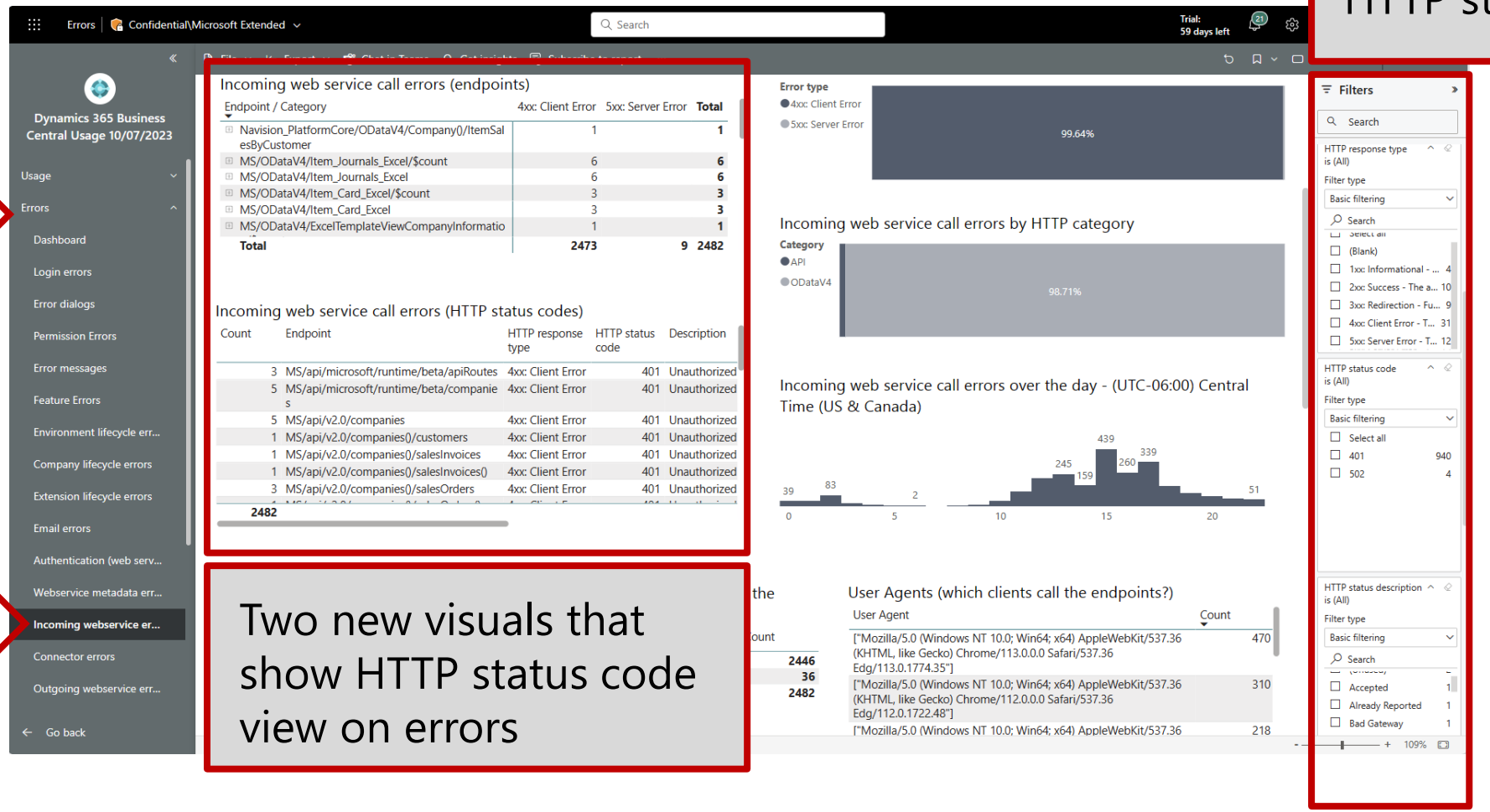


Troubleshoot web service calls



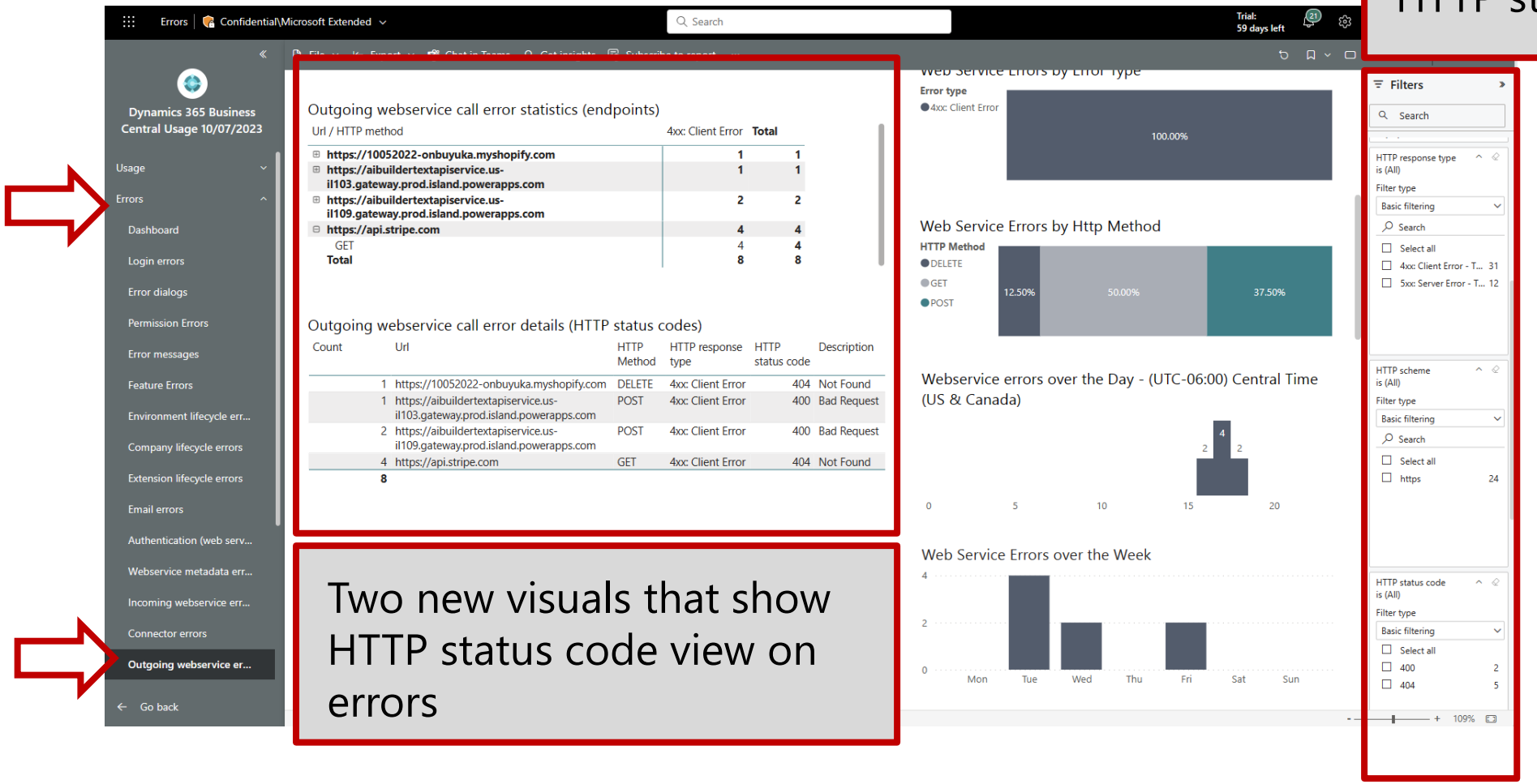
Easier troubleshooting of incoming web service errors

Improved filters on HTTP status codes



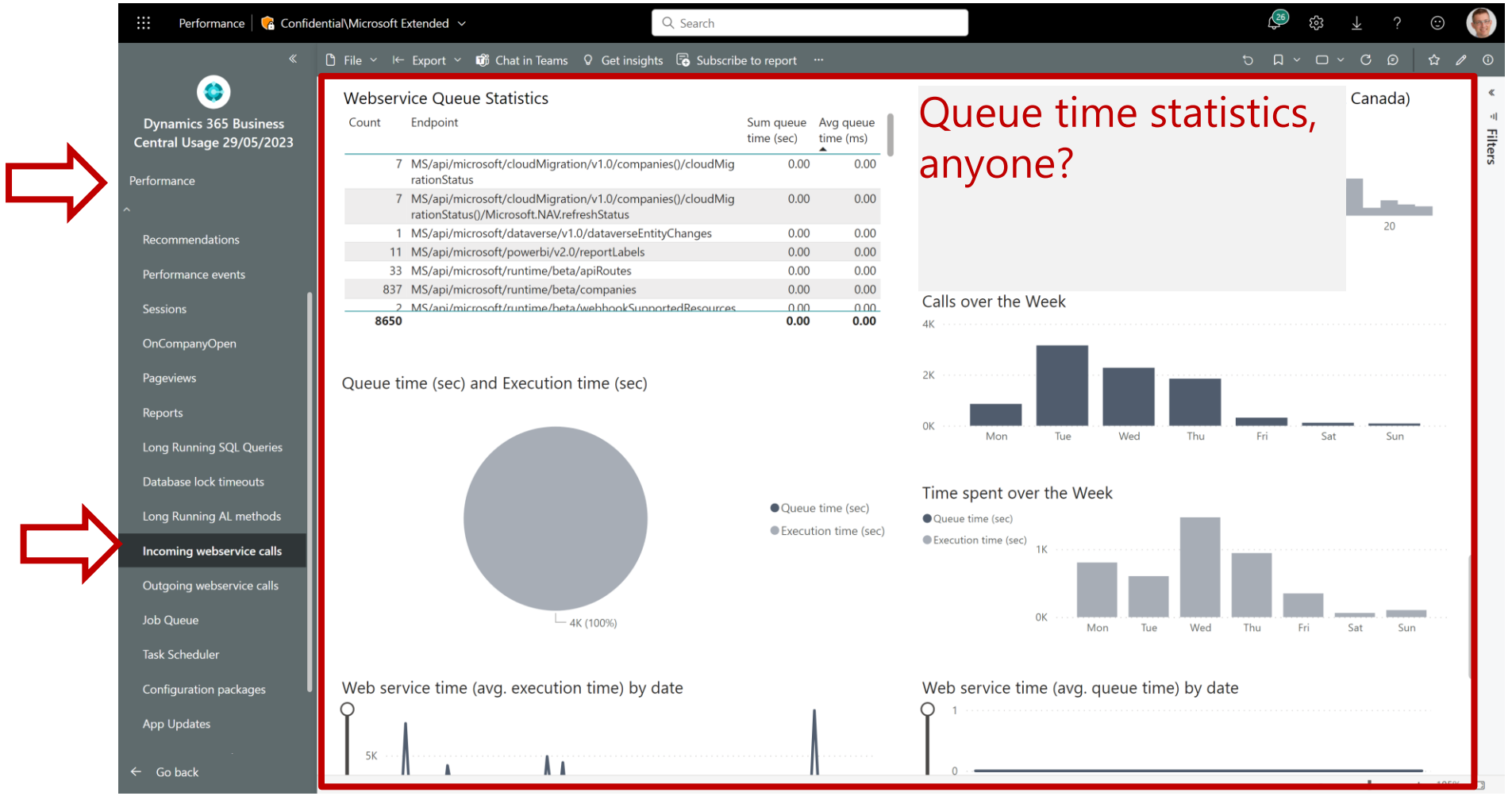
Easier troubleshooting of outgoing web service errors

Improved filters on HTTP status codes



Two new visuals that show HTTP status code view on errors

Does your API calls get queued up?



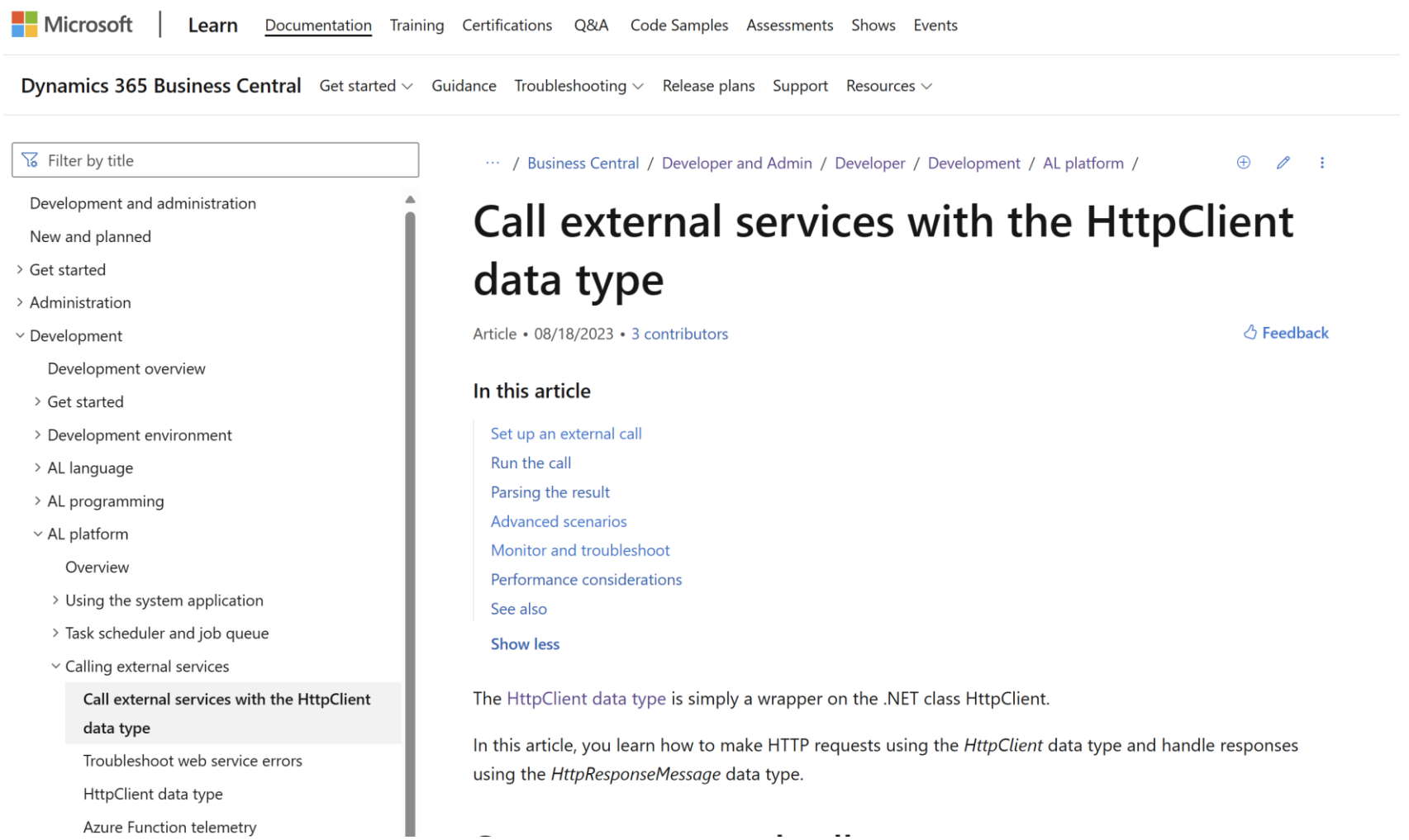
AL developers can write more resilient AL code when calling webservices

Error handling best practices for Httpclient now part of docs.

TSGs added to docs for better troubleshooting of WS calls.

Huge makeover of Httpclient docs.

New e2e article on how to use Httpclient



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We explain how Httpclient.Send calls can fail

Ways that HttpClient.Get calls can fail

The method HttpClient.Get can fail and return false in the following ways:

- The requestUri is not an absolute URI.
- The request failed due to an underlying issue such as network connectivity, DNS failure, server certificate validation or timeout.
- The request failed due to timeout.

> ⓘ **Important**
>
> Outbound HTTP calls from extensions are blocked by default and must be approved for each extension, otherwise instead of an external call, the system will display the following error message: The request was blocked by the runtime to prevent accidental use of production services.
>
> To enable outbound HTTP calls, go to the **Extension Management** page in Business Central, and choose **Configure**. Then, on the **Extension Settings** page, make sure that **Allow HttpClient Requests** is selected. This setting must be enabled for each extension, including libraries.

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We show how to implement error handling

Example (HTTP GET)

A GET request shouldn't send a body and is used (as the method name indicates) to retrieve (or get) data from a resource. To make an HTTP GET request, given an HttpClient and a URI, use the HttpClient.Get method:

AL Copy

```
local procedure GetRequest() ResponseText: Text
var
    Client: HttpClient;
    IsSuccessful: Boolean;
    Response: HttpResponseMessage;
    ResponseText: Text;
begin
    IsSuccessful := Client.Get('https://jsonplaceholder.typicode.com/todos/3', Response);

    if not IsSuccessful then begin
        // handle the error
    end;

    if not Response.IsSuccessStatusCode() then begin
        HttpStatusCode := response.HttpStatusCode();
        // handle the error (depending on the HTTP status code)
    end;

    Response.Content().ReadAs(ResponseText);

    // Expected output:
    //   GET https://jsonplaceholder.typicode.com/todos/3 HTTP/1.1
    //   {
    //     "userId": 1,
    //     "id": 3,
    //     "title": "fugiat veniam minus",
    //     "completed": false
    //   }
end;
```

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We show how to check HTTP status codes for errors

Parsing the result

If the HttpClient call succeeds, you get a response back from the service you called. The response is saved in the data type HttpResponseMessage, where you can parse it to use the information in your app. The service call itself might not succeed, so make sure that you check the HTTP status code in your AL code.

The following example illustrates the error handling you need to setup for handling errors from the service that you called.

AL Copy

```
local procedure GetRequest() ResponseText: Text
var
    Client: HttpClient;
    IsSuccessful: Boolean;
    ServiceCallErr: Label 'Web service call failed.';
    ErrorInfoObject: ErrorInfo;
begin
    IsSuccessful := Client.Get('https://httpcats.com/418.json', HttpResponseMessage);

    if not IsSuccessful then begin
        // handle the error
    end;

    if not HttpResponseMessage.IsSuccessStatusCode() then begin
        HttpStatusCode := HttpResponseMessage.HttpStatusCode();
        ErrorInfoObject.DetailedMessage := 'Sorry, we could not retrieve the cat info right now.
        ErrorInfoObject.Message := Format(ServiceStatusErr, HttpStatusCode, HttpResponseMessage.
        Error(ErrorInfoObject);
    end;

    HttpResponseMessage.Content().ReadAs(ResponseText);
end;
```

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We explain common HTTP status codes for client errors

When you call a web service endpoint, either a Business Central API or from AL using Httpclient datatype, you get an HTTP status code as part of the response. All HTTP status codes that start with 4 (sometimes also written 4xx) are classified as client errors and it is your responsibility to react on these errors and fix them in your code.

In the following table, we list some common 4xx HTTP status codes and suggestions to how to fix them:

HTTP status code	Short name	Description	Suggested solution(s)
400	Bad Request	This status code indicates that the server can't or won't process the request due to an error on the client side. For example, it could be a malformed request syntax, header too long, or something else.	The client needs to fix things on their end. For an incoming call of category OData/API, consider using telemetry to find the error. You can also set up a debugger and debug the endpoint code. For an outgoing call, you need to review/debug the AL code that sends the request.
401	Access denied	The request failed because it lacks valid authentication credentials for the target resource.	For an incoming call, this is an authorization issue on the Business Central end of this, either in the OnOpenCompany trigger or a permission issue. For an outgoing call, you need to examine the AL code that sets up certificates or sets authorization header(s).
402	Payment Required	Indicates that the caller must make a payment to access the requested resource. Typically used in situations where the server requires payment before granting access to the content or service. This status code isn't returned by the Business Central server for incoming calls.	For an outgoing call, you need to examine the AL code that calls the service and setup error handling to handle this situation.
403	Forbidden	This status code is returned when there's some kind of access restriction policy implemented for the requested resource.	For an outgoing call, you need to examine the AL code that sets up certificates or sets authorization header(s). Or maybe your app shouldn't call the specified endpoint at all.
404	Not found	The resource you're calling	

AL developers can understand exceptions when calling webservices

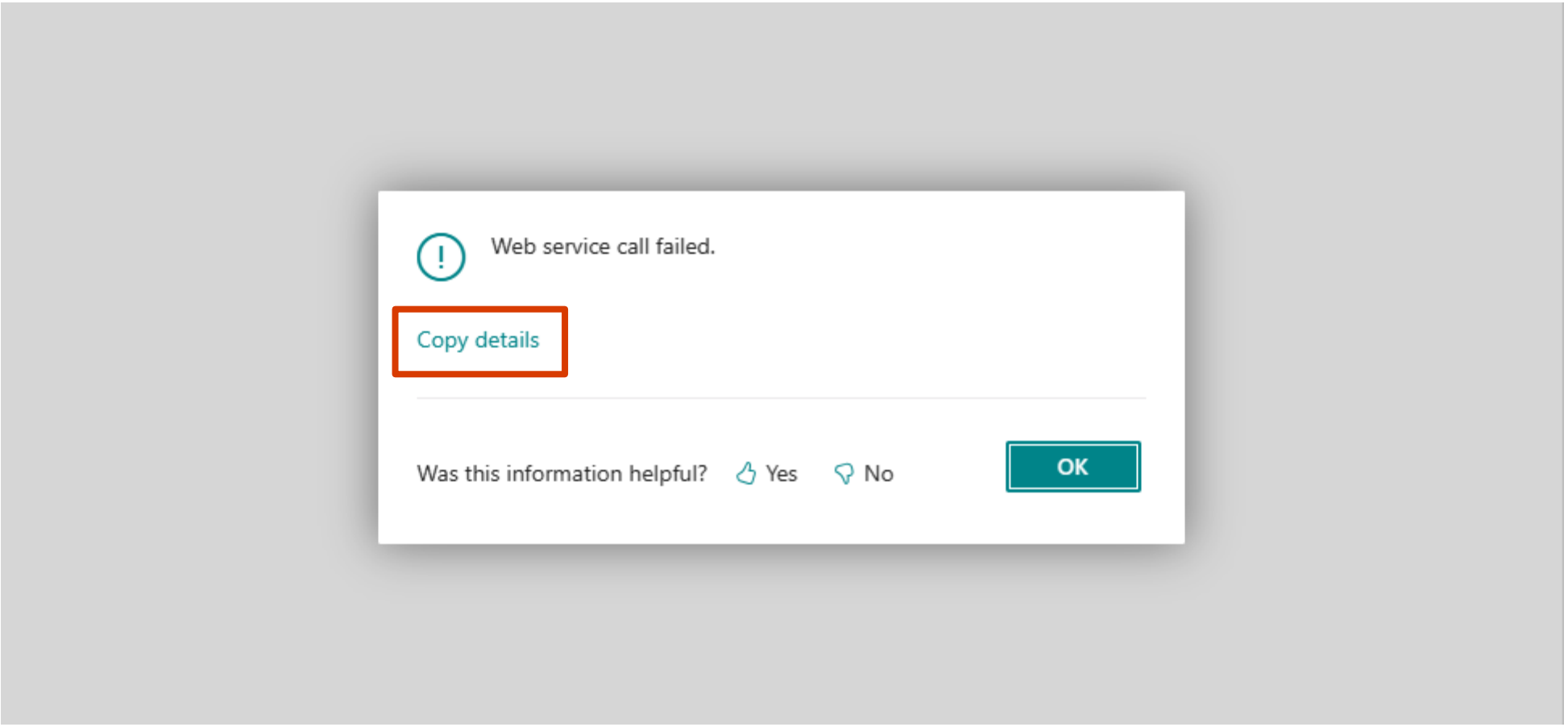
When Httpclient.Send fails, we now allow AL developers to see the root cause

- Malformed URI
- Network error (it is always DNS)
- Network error (timeout)
- Network error (connectivity)
- Certificate errors

Source code example: better AL error reporting for HttpClient failures

```
… setting up Httpclient …

IsSuccessfull := HttpClient.Get(URL, Response);

if not IsSuccessfull then begin
    HttpExceptionDetails := System.GetLastErrorText();
    ErrorInfoObject.DetailedMessage := HttpExceptionDetails;
    ErrorInfoObject.Message := ServiceCallErr;
    Error(ErrorInfoObject);
end;

… more code …
```

Developers can put the real error message in details



Example: detailed error message (Httpclient errors)

Before

If requesting support, please provide the following details to help troubleshooting:

Web service call failed.

The SSL connection could not be established, see inner exception.

Internal session ID:
d200e4f7-8f74-4ca4-aed6-94dea67fad1e

Application Insights session ID:
0394a70a-e164-4451-b1f5-93835b6c1722

Client activity id:
ac3a1952-19bf-4609-a110-c6d01c96e59a

Time stamp on error:
2023-08-23T13:18:28.4236625Z

User telemetry id:
00000000-0000-0000-0000-000000000000

AL call stack:
APICallTest(Page 50123)."Unhealthy Endpoint A - OnAction"(Trigger) line 40 - TestBAGCall by Default publisher

Custom dimensions:
[]

Now (23.0)

If requesting support, please provide the following details to help troubleshooting:

Web service call failed.

The SSL connection could not be established, see inner exception.

The remote certificate is invalid according to the validation procedure: RemoteCertificateNameMismatch, RemoteCertificateChainErrors

Internal session ID:
0b9283c2-d830-445e-a9db-b7ef4e73d8ad

Application Insights session ID:
1b0bc9b1-bedb-40bb-80b9-cbc2704e9651

Client activity id:
0d2a510f-e8d6-4ac9-8eae-5b5be27221f6

Example: detailed error message

Before

If requesting support, please provide the following details to help troubleshooting:

Web service call failed.

PKCS12 (PFX) without a supplied password has exceeded maximum allowed iterations. See https://go.microsoft.com/fwlink/?linkid=2233907 for more information.

Internal session ID:
974a987f-dcae-4abd-a99b-99ff39acb981

Application Insights session ID:
3577cf73-6798-43cc-a4ab-301cac8152d9

Client activity id:
93590c00-2931-42c3-850e-5bab2cca7a19

Time stamp on error:
2023-08-23T13:45:14.3590559Z

Now (23.0)

If requesting support, please provide the following details to help troubleshooting:

Web service call failed.

PKCS12 (PFX) without a supplied password has exceeded maximum allowed iterations. See https://go.microsoft.com/fwlink/?linkid=2233907 for more information.

Padding is invalid and cannot be removed.

Internal session ID:
b7f38c21-a2df-4d35-a262-7e286b98c3ee

Application Insights session ID:
97d5a457-36d9-4cab-bd40-d6fcc336f2ce

Client activity id:

(Outgoing) Webservice stack more robust towards port exhaustion

Large number of outgoing calls using AL Httpclient could starve the VM for ports.

Before: outgoing web service calls would fail.

Now: we use a pool of Httpclient objects so that port exhaustion cannot occur

Backported and available from 21.x.

API changes coming in 2024 release wave 1

Schema version for custom APIs (changed default)

Removed or Replaced?	Why?
Replaced	The API capability in Business Central is used many places, e.g. in the APIs that come out-of-the-box. For these APIs, $schemaversion is always set to 2.0 to get the latest features in the Business Central OData stack. For custom APIs, it it possible to get these new features by simply calling the API with $schemaversion=2.0. Starting in version 24, the default value of $schemaversion is set to 2.0, also for custom APIs.

Support for Delta Links with APIs (warning)

Removed or Replaced?	Why?
Replaced	Delta links are opaque, service-generated links that a web service client can use to retrieve subsequent changes to a result (see Using Delta Links with APIs). This feature was introduced in Business Central (online version only) to support the Microsoft Invoicing product, which hasn't been available for years. In version 23, the ChangeTrackingAllowed property on API pages/queries will be marked as deprecated. Starting in version 24, ChangeTrackingAllowed will be set to "false" for all APIs provided by Microsoft and support for delta links will be removed from the server. Since the delta links feature was first introduced, the webhooks functionality in Business Central has been added and improved, making it the preferred approach to change tracking. For more information about the use of webhooks, see Working with Webhooks in Dynamics 365 Business Central.

Go dos

Fix metadata issues

Use the new page in telemetry app.

Fix any naming issues etc

Write robust client code (incoming)

Handle response code 503.

Look at the TSG and harden your calling client.

Write robust AL code (outgoing)

Handle errors in AL code.

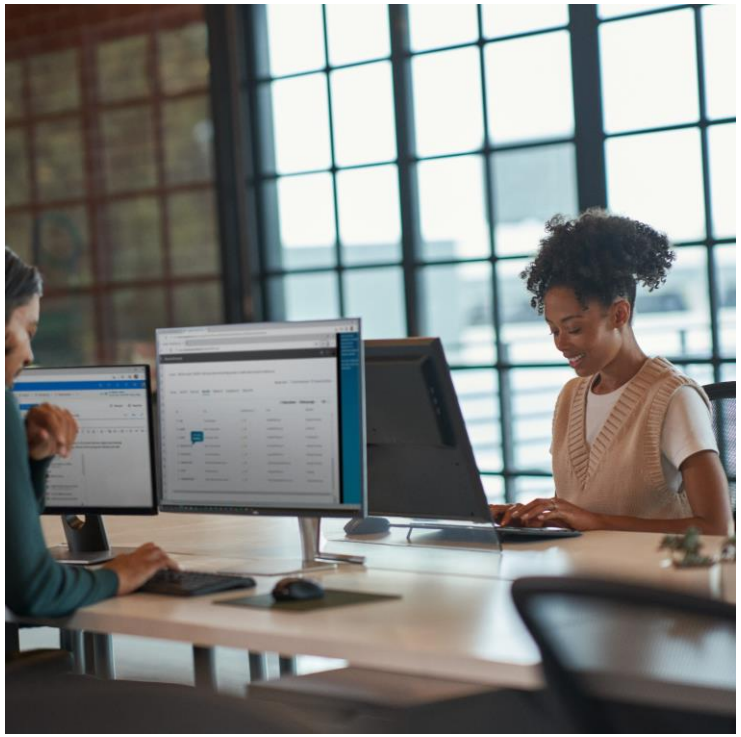
Consider retrying.

Provide relevant details as detailed information in error dialogs.

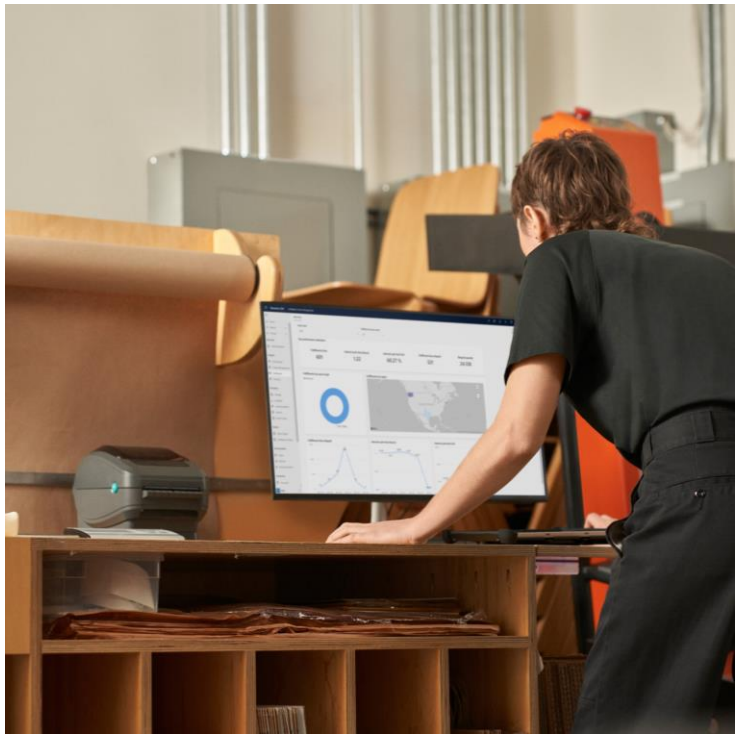
Stop using delta links

Feature is deprecated

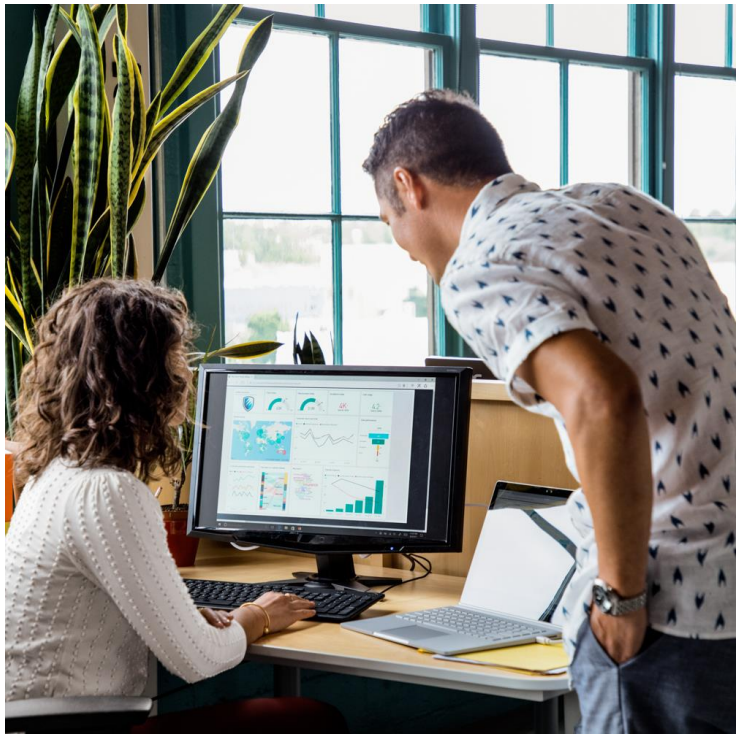
Watch other relevant launch event sessions



What's new: Developer tools



What's new: Dataverse & Dynamics 365 app integration - Part 2



What's new: Telemetry

General Business Central resources, learn more!

Have a question?

aka.ms/BCYammer

Join the conversation

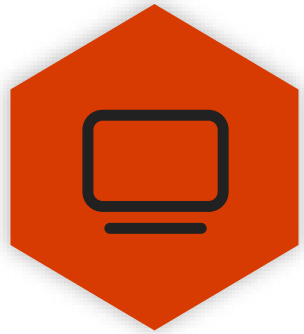
twitter.com/MSDyn365BC

Looking for resources?

aka.ms/BCAll

Submit your ideas

aka.ms/BCIdeas



Join the office hours

aka.ms/BCOfficeHours

Thank you

Microsoft Dynamics 365

What's new in Server and Database

New reporting capabilities

Agenda

- a faster runtime
- a faster data stack
- more stable web services
- **new reporting capabilities**

New Data Analysis UI on queries

Open query URL

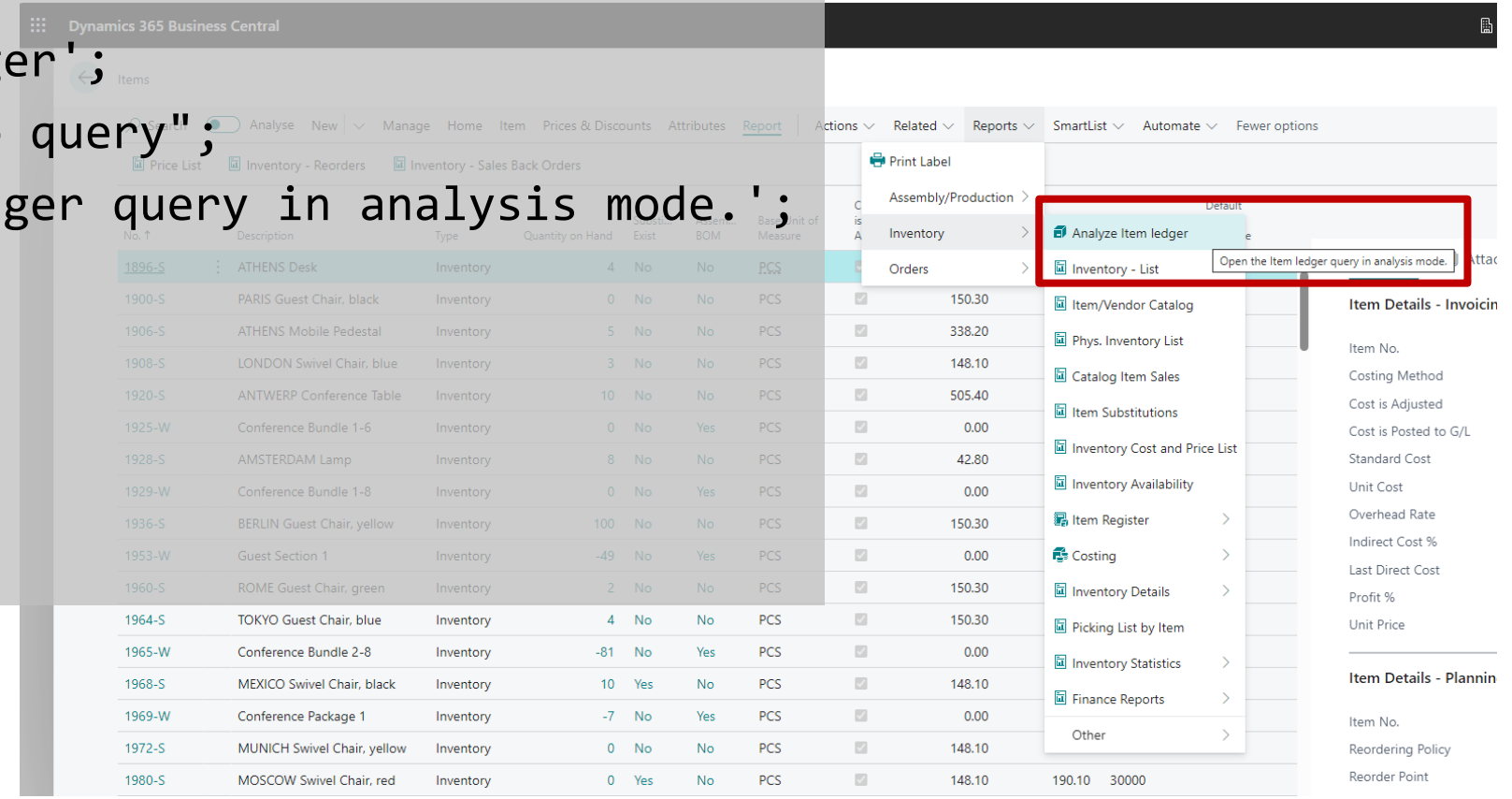
/?query=<query object id>

New: *Analysis* toggle button – opens new UI

New: Support for RunObject

RunObject on a query

```
pageextension 50110 ItemListWithQuery extends "Item List“
{
actions {
addbefore("Inventory - List") {
action("Analyze items") {
ApplicationArea = All;
Caption = 'Analyze Item ledger';
RunObject = query "Item hero query";
Tooltip = 'Open the Item ledger query in analysis mode.';
Image = Item;
}
}
}
}
```



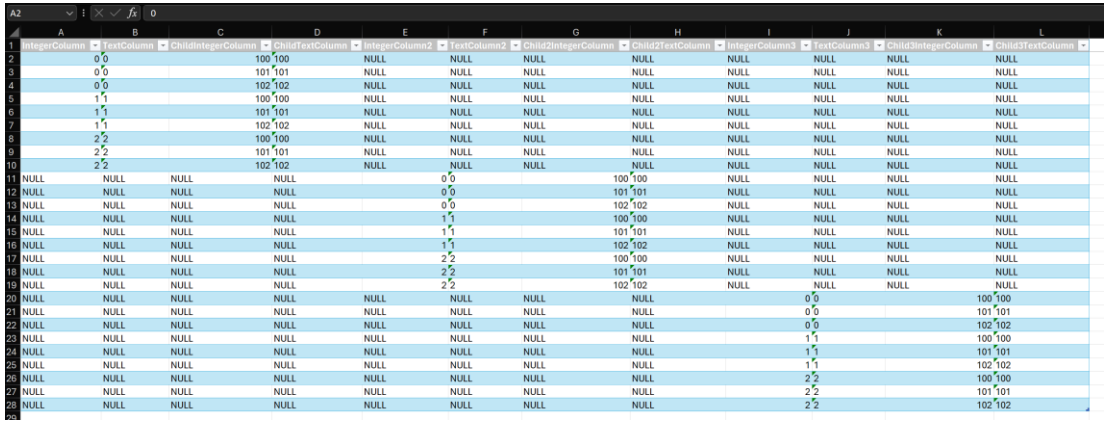
Multi-worksheet data in Excel layouts

Excel layouts feature did not handle parent-child/overview-detail types of data very well.

With this change, such report datasets can be designed in a way that enables a very rich way to model things further in PowerPivot.

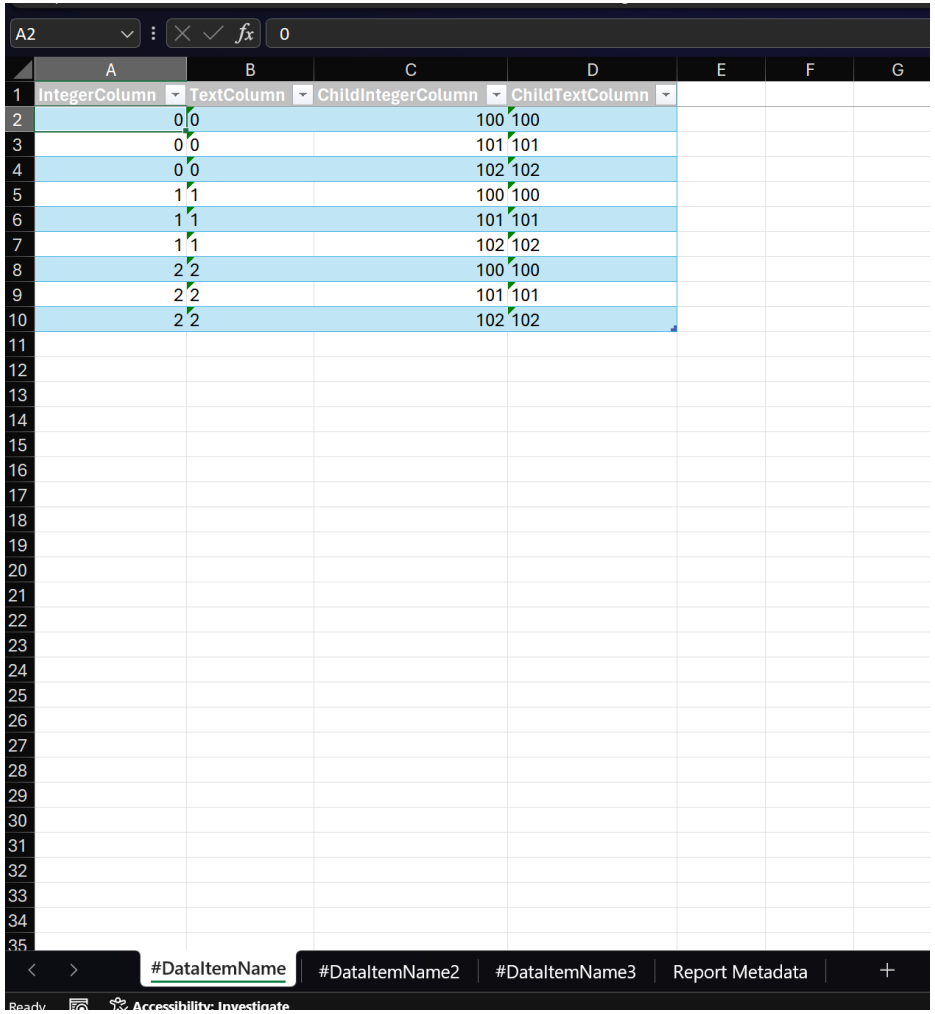
How it works

ExcelLayoutMultipleDataSheets = false

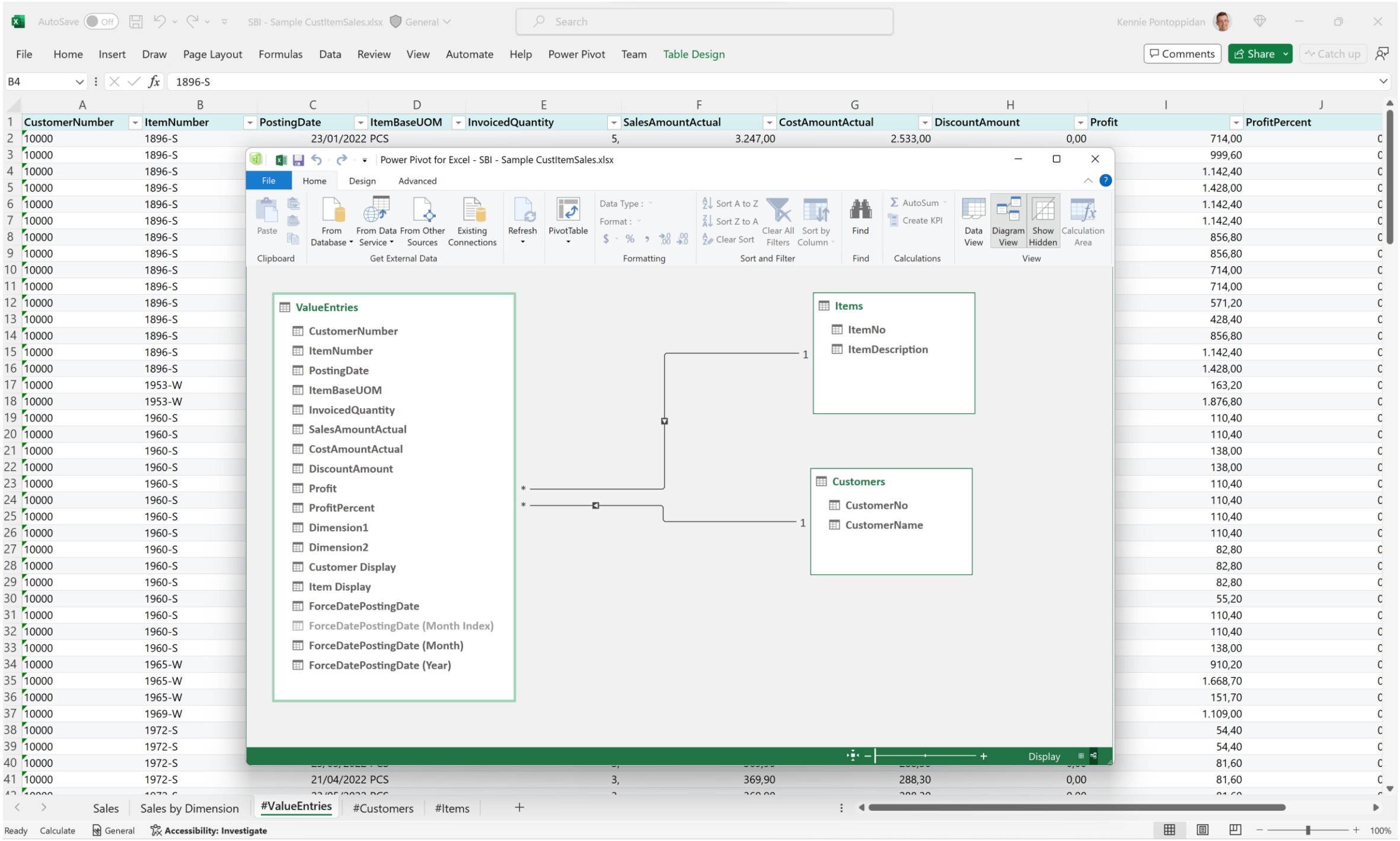


IntegerColumn	TextColumn	ChildIntegerColumn	ChildTextColumn	IntegerColumn2	TextColumn2	Child2IntegerColumn	Child2TextColumn	IntegerColumn3	TextColumn3	Child3IntegerColumn	Child3TextColumn
0	0	100	100	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL
0	0	101	101	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL
0	0	102	102	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL
1	1	100	100	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL
1	1	101	101	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL
1	1	102	102	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL
2	2	100	100	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL
2	2	101	101	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL
2	2	102	102	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL
NULL	NULL	NULL	NULL	0	0	100	100	NULL	NULL	NULL	NULL
NULL	NULL	NULL	NULL	0	0	101	101	NULL	NULL	NULL	NULL
NULL	NULL	NULL	NULL	0	0	102	102	NULL	NULL	NULL	NULL
NULL	NULL	NULL	NULL	1	1	100	100	NULL	NULL	NULL	NULL
NULL	NULL	NULL	NULL	1	1	101	101	NULL	NULL	NULL	NULL
NULL	NULL	NULL	NULL	1	1	102	102	NULL	NULL	NULL	NULL
NULL	NULL	NULL	NULL	2	2	100	100	NULL	NULL	NULL	NULL
NULL	NULL	NULL	NULL	2	2	101	101	NULL	NULL	NULL	NULL
NULL	NULL	NULL	NULL	2	2	102	102	NULL	NULL	NULL	NULL
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	0	0	100	100
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	0	0	101	101
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	0	0	102	102
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	1	1	100	100
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	1	1	101	101
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	1	1	102	102
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	2	2	100	100
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	2	2	101	101
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	2	2	102	102

ExcelLayoutMultipleDataSheets = true



IntegerColumn	TextColumn	ChildIntegerColumn	ChildTextColumn
0	0	100	100
0	0	101	101
0	0	102	102
1	1	100	100
1	1	101	101
1	1	102	102
2	2	100	100
2	2	101	101
2	2	102	102



CustomerNumber	ItemNumber	PostingDate	ItemBaseUOM	InvoicedQuantity	SalesAmountActual	CostAmountActual	DiscountAmount	Profit	ProfitPercent
10000	1896-S	23/01/2022	PCS	5,	3.247,00	2.533,00	0,00	714,00	0
10000	1896-S							999,60	0
10000	1896-S							1.142,40	0
10000	1896-S							1.428,00	0
10000	1896-S							1.142,40	0
10000	1896-S							1.142,40	0
10000	1896-S							856,80	0
10000	1896-S							856,80	0
10000	1896-S							714,00	0
10000	1896-S							714,00	0
10000	1896-S							571,20	0
10000	1896-S							428,40	0
10000	1896-S							856,80	0
10000	1896-S							1.142,40	0
10000	1896-S							1.428,00	0
10000	1953-W							163,20	0
10000	1953-W							1.876,80	0
10000	1960-S							110,40	0
10000	1960-S							110,40	0
10000	1960-S							138,00	0
10000	1960-S							138,00	0
10000	1960-S							110,40	0
10000	1960-S							110,40	0
10000	1960-S							110,40	0
10000	1960-S							110,40	0
10000	1960-S							82,80	0
10000	1960-S							82,80	0
10000	1960-S							82,80	0
10000	1960-S							55,20	0
10000	1960-S							110,40	0
10000	1960-S							110,40	0
10000	1960-S							138,00	0
10000	1965-W							910,20	0
10000	1965-W							1.668,70	0
10000	1965-W							151,70	0
10000	1969-W							1.109,00	0
10000	1972-S							54,40	0
10000	1972-S							54,40	0
10000	1972-S							81,60	0
10000	1972-S	21/04/2022	PCS	3,	369,90	288,30	0,00	81,60	0

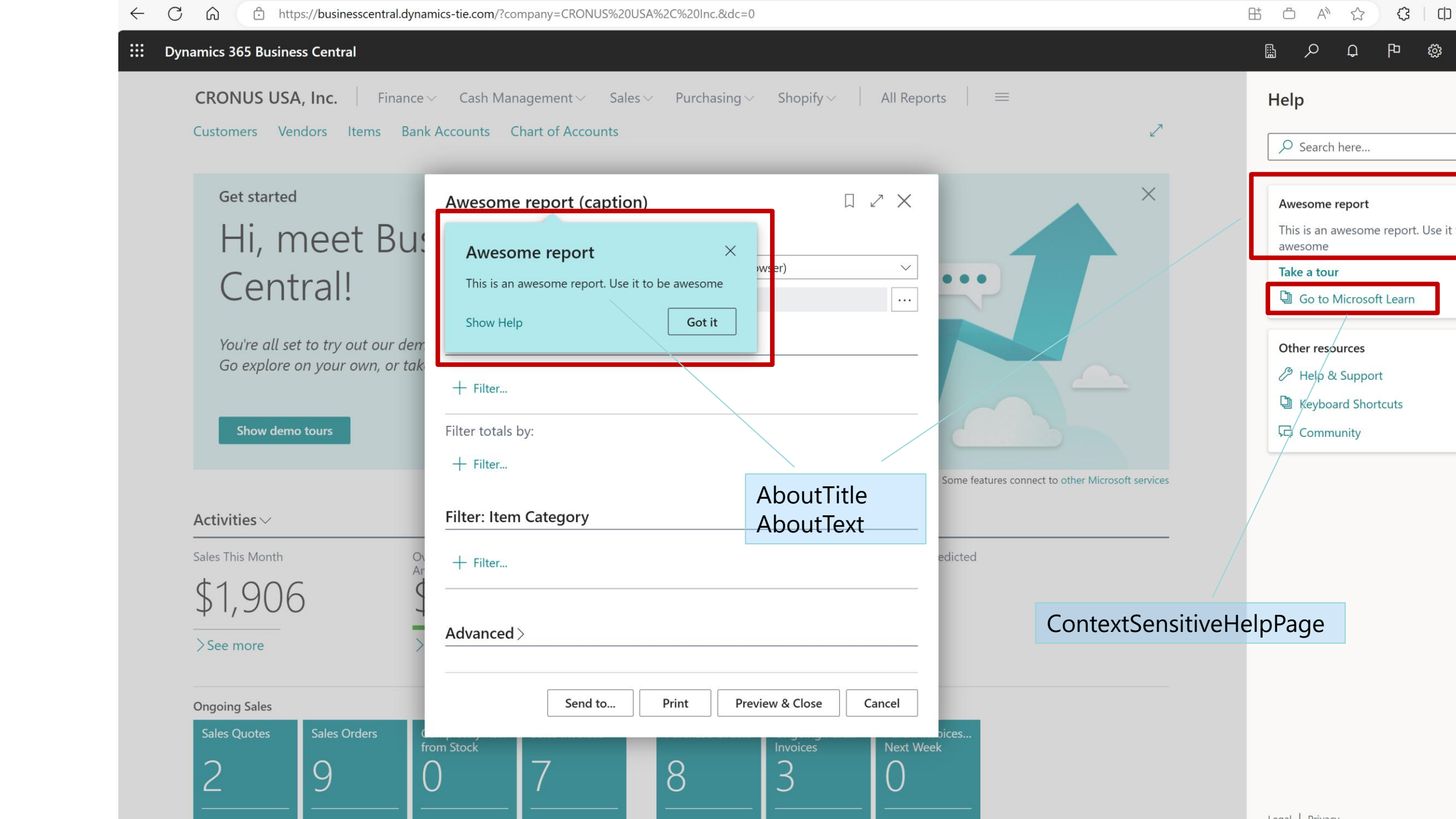
Multi-worksheet data in Excel layouts

```
report 50101 MyReport {

        ExcelLayoutMultipleDataSheets = true;

         // more code here...
}
```

Teaching tips and help links on queries and reports

Help users understand what reports and queries can be used for.

Give them help links for the specific report or query.


https://businesscentral.dynamics-tie.com/?company=CRONUS%20USA%2C%20Inc.&dc=0
Dynamics 365 Business Central
CRONUS USA, Inc.
Finance
Cash Management
Sales
Purchasing
Shopify
All Reports
Customers
Vendors
Items
Bank Accounts
Chart of Accounts
Get started
Hi, meet Bus
Central!
You're all set to try out our dem
Go explore on your own, or tak
Show demo tours
Some features connect to other Microsoft services
Activities
Sales This Month
$1,906
See more
Ongoing Sales
Sales Quotes
2
Sales Orders
9
from Stock
0
7
8
Invoices
3
Next Week
0
Awesome report (caption)
Awesome report
This is an awesome report. Use it to be awesome
Show Help
Got it
Filter...
Filter totals by:
Filter...
Filter: Item Category
Filter...
Advanced
Send to...
Print
Preview & Close
Cancel
AboutTitle
AboutText
Help
Search here...
Awesome report
This is an awesome report. Use it
awesome
Take a tour
Go to Microsoft Learn
Other resources
Help & Support
Keyboard Shortcuts
Community
ContextSensitiveHelpPage

https://businesscentral.dynamics-tie.com/?company=CRONUS%20USA%2C%20Inc.&page=50100&datasourcetype=Query&dc=0&bookmark=2F_tMMAAJ7_zEAOAA5ADYALQBT...

Dynamics 365 Business Central

KP

Analyze your inventory

Analyze your inventory (slice and dice your data)

Use this data cube to analyze your inventory. You can group and/or the data on any dimension you like.

Show Help

Got it

		Item...	Is...	Base Unit o...	Type	Costing...
			No	PCS	Inventory	FIFO
			No	PCS	Inventory	FIFO
			No	PCS	Inventory	FIFO
			No	PCS	Inventory	FIFO
1896-S	ATHENS Desk		No	PCS	Inventory	FIFO
1896-S	ATHENS Desk		No	PCS	Inventory	FIFO
1896-S	ATHENS Desk		No	PCS	Inventory	FIFO
1896-S	ATHENS Desk		No	PCS	Inventory	FIFO
1896-S	ATHENS Desk		No	PCS	Inventory	FIFO
1896-S	ATHENS Desk		No	PCS	Inventory	FIFO
1896-S	ATHENS Desk		No	PCS	Inventory	FIFO
1896-S	ATHENS Desk		No	PCS	Inventory	FIFO
1896-S	ATHENS Desk		No	PCS	Inventory	FIFO
1896-S	ATHENS Desk		No	PCS	Inventory	FIFO
1896-S	ATHENS Desk		No	PCS	Inventory	FIFO
1896-S	ATHENS Desk		No	PCS	Inventory	FIFO
1896-S	ATHENS Desk		No	PCS	Inventory	FIFO
1896-S	ATHENS Desk		No	PCS	Inventory	FIFO
1896-S	ATHENS Desk		No	PCS	Inventory	FIFO
1896-S	ATHENS Desk		No	PCS	Inventory	FIFO
1896-S	ATHENS Desk		No	PCS	Inventory	FIFO
1896-S	ATHENS Desk		No	PCS	Inventory	FIFO

Pivot Mode

Search...

- Item No.
- Item description
- Item discount group
- Is item blocked?
- Base Unit of Measure
- Type
- Costing Method
- Unit Cost
- Standard Cost
- Item Category Code
- Cost is Adjusted
- Tariff No.
- Indentation
- Item category descriptio
- Item parent category coc
- Location Code

Columns

Analysis Filters

Row Groups

Drag here to set row groups

Values

- Sum(Unit Cost)
- Sum(Standard C...
- Sum(Indentation)
- Sum(Remaining ...

Help

Search here...

Analyze your inventory (slice and dice your data)

Use this data cube to analyze your inventory. You can group and/or the data on any dimension you like.

Take a tour

Go to Microsoft Learn

Other resources

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Development overview
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Development environment
AL language
A tour of the AL language
FAQ for AL developers
Program building blocks
Language elements
Error handling
Formatting values
Tables and data
Pages and user interfaces
Developing reports
Overview
Report design overview
Report object

Reports Overview

Article • 09/04/2023 • 6 contributors

Feedback

In this article

Creating reports
Getting started
See Also

You can use reports to print or display information from a Business Central database. Use reports to structure and summarize information to print documents, such as invoices. For example, create a report that lists all customers and orders that have been added by each customer. Also, create a report that is automatically filled with the relevant information for an invoice.

Reports can also be used to process data without printing or displaying content. For example, use a report to automate updating all prices in an item list. It can be easier to create a report to process data instead of a codeunit to do the same processing because you can use:

- Request page functionality to select options and filters for data items, which are available in a report but are difficult to add to a codeunit. For more information, see Using request pages with reports.
- Report data items instead of writing code to open tables and retrieve records.
- Data modeling, which is available when you design reports.

Additional resources

Training

Module
Use the report design process in Dynamics 365 Business Central - Training

Do you want to learn about the report design process for Microsoft Dynamics 365 Business Central? If so, this module will explain the different...

Documentation

Number Sequences - Business Central

This topic describes how to create number sequences in AL code in Dynamics 365 Business Central.

Simple Role Center Example - Business Central

Provides AL code for a simple role center

Defining Multiple Report Layouts - Business Central

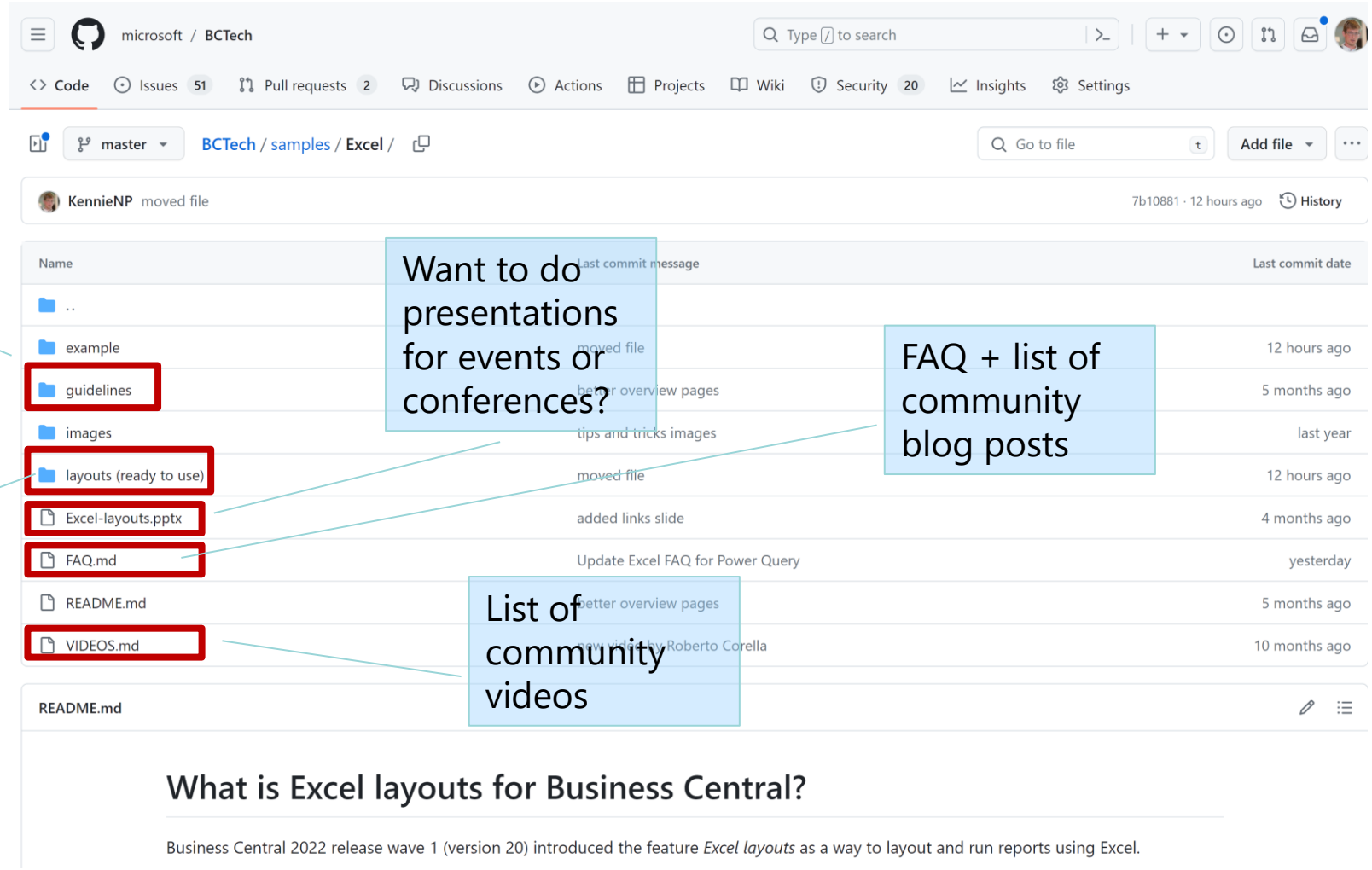
Describes how to define multiple layouts for one report in Business Central using AL.

Show 5 more

aka.ms/bcexcelsamples

Tips and tricks for datasets and layouts

Sample layouts for existing reports



Want to do presentations for events or conferences?

FAQ + list of community blog posts

List of community videos

Go dos

Understand analytics requirements

Stop developing reports.

Start supporting analytics needs.

Learn how to Power BI

Business Intelligence (BI) is closely related to ERP.

Power BI is here to stay and is the suggested platform for BI on Business Central data.

Learn how to write AL queries

AL queries are not only for performance tuning anymore.

Queries are a powerful tool to implement data mashups for self-service data analysis.

“Build me a report” might just mean “Build me a query.”

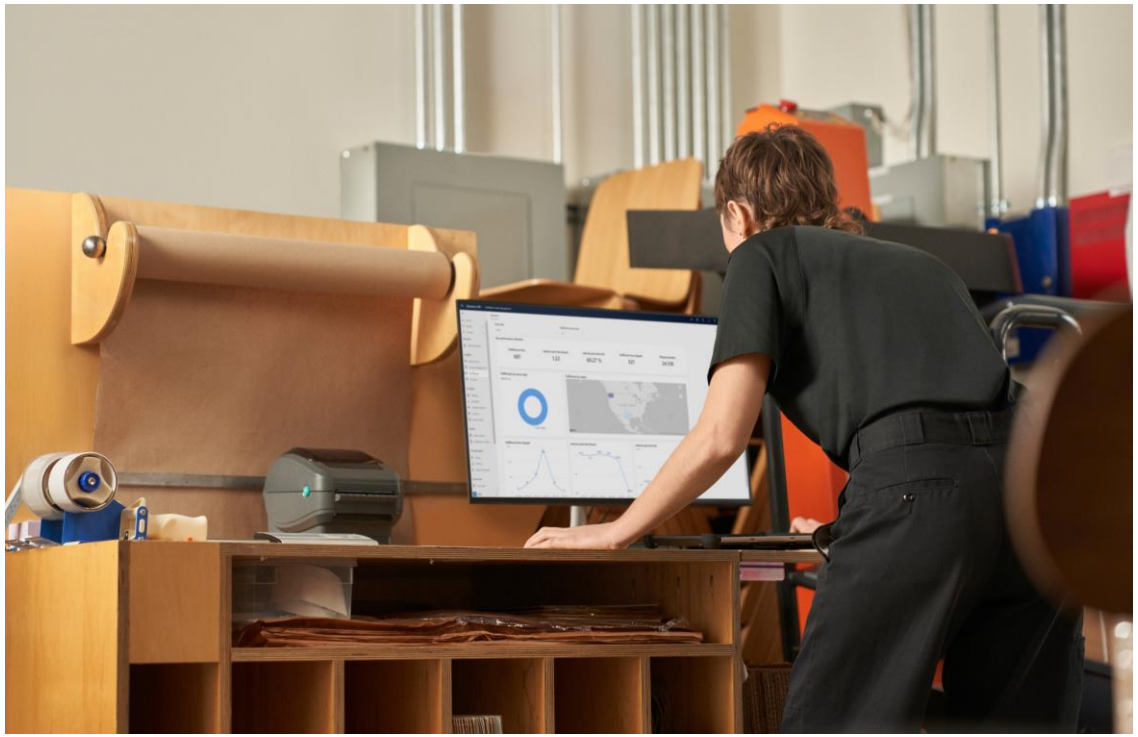
Learn how to design AL for Excel layouts

Your job as an AL report developer is changing. In many cases, a good report dataset is enough to unblock the customer.

“Build me a report” might just mean “Build me a report dataset.”

Watch other relevant launch event sessions

What's new: Power BI and reporting (for developers)



Introducing: Analyze data on lists and queries

General Business Central resources, learn more!

Have a question?

aka.ms/BCYammer

Join the conversation

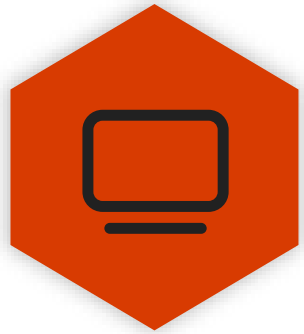
twitter.com/MSDyn365BC

Looking for resources?

aka.ms/BCAll

Submit your ideas

aka.ms/BCIdeas



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Thank you