

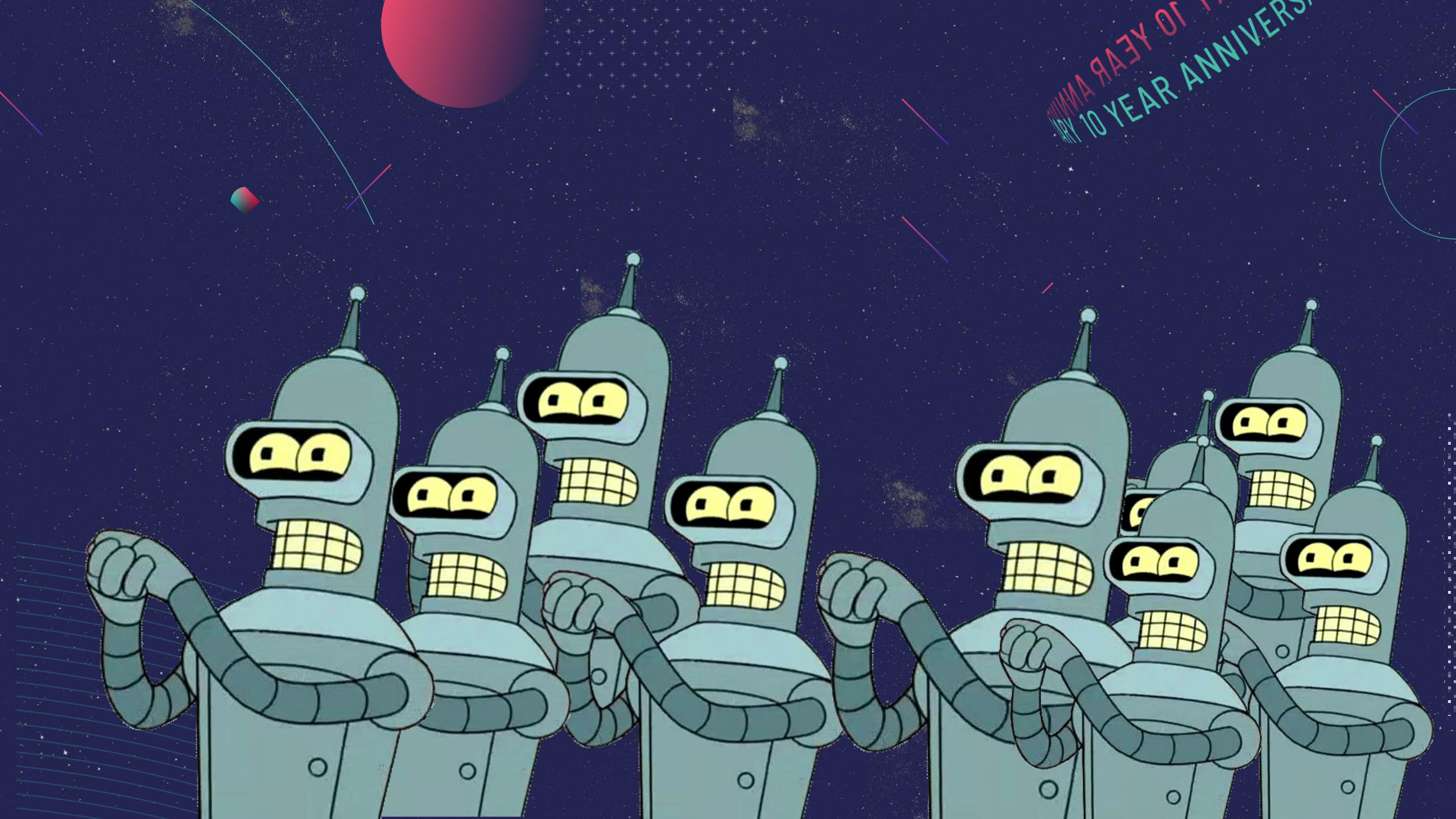


mibuso.com

# Bad habits of AI Developers

## Vjeko & waldo & Vjeko









*Builders often  
live in unfinished  
houses*



*Chefs rarely cook  
extravagant meals at home*

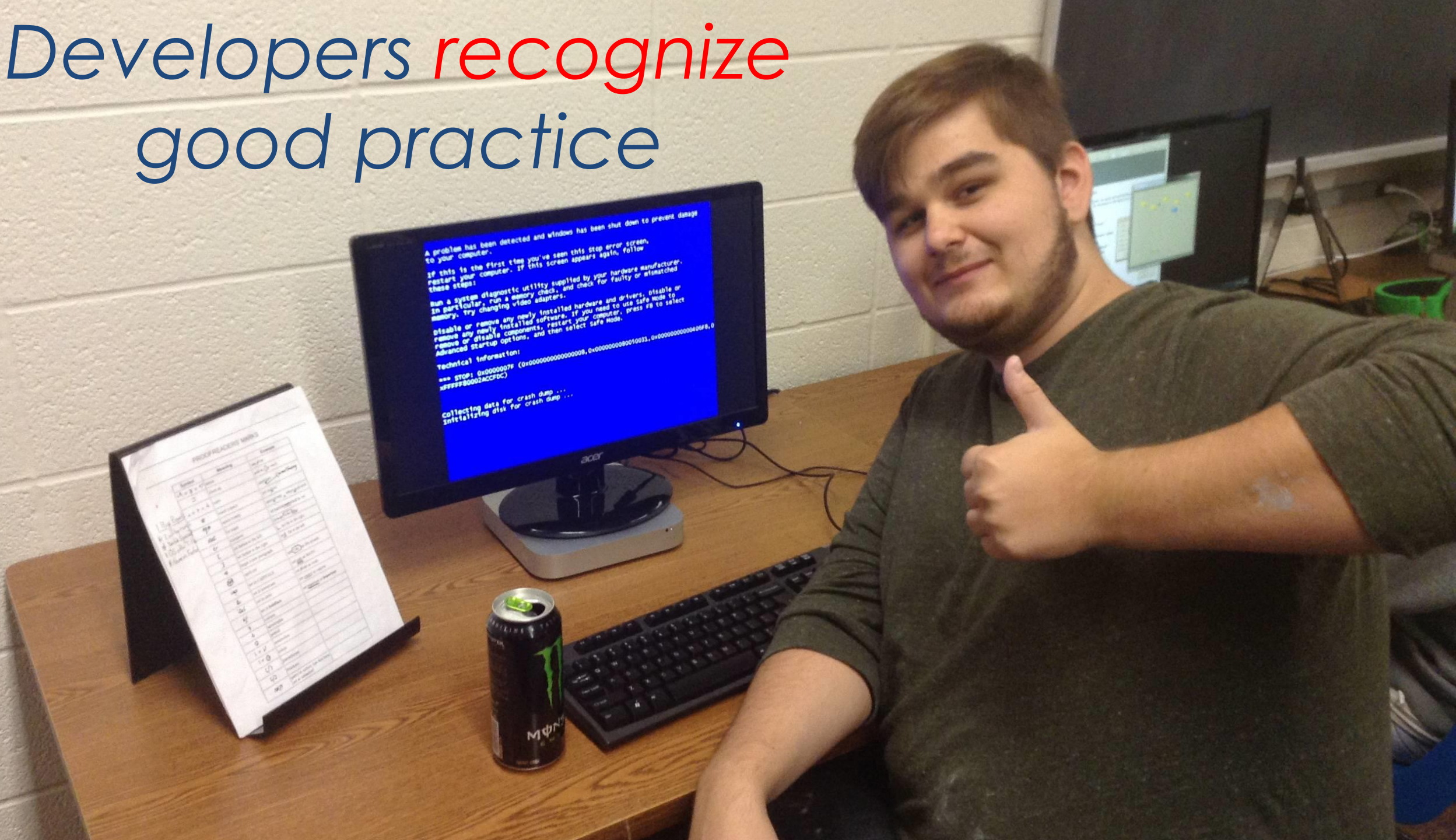




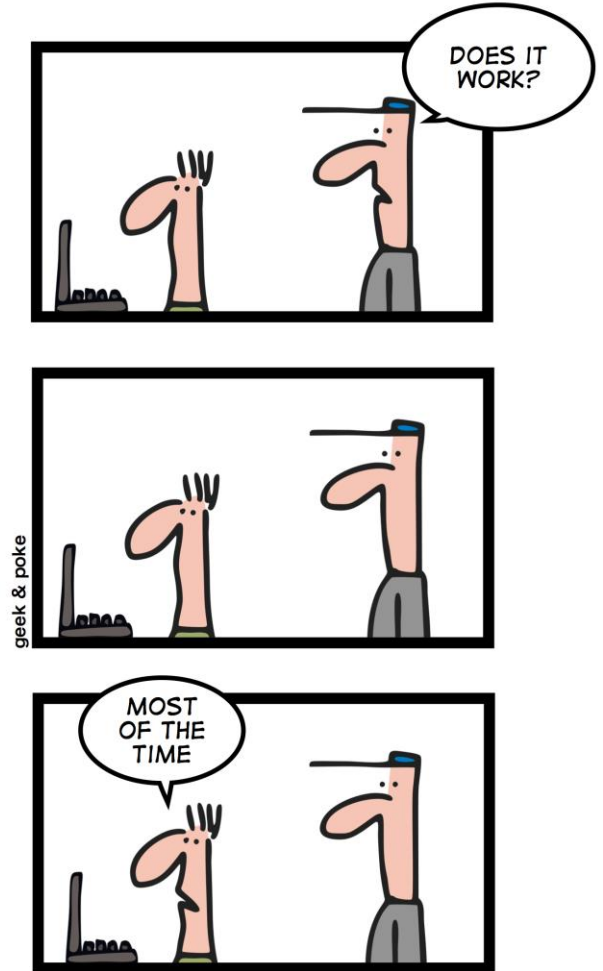
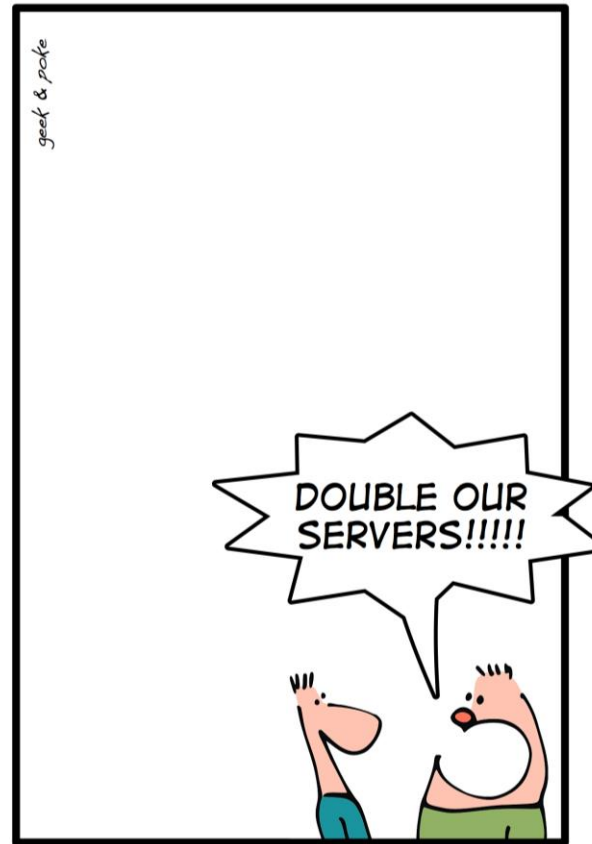
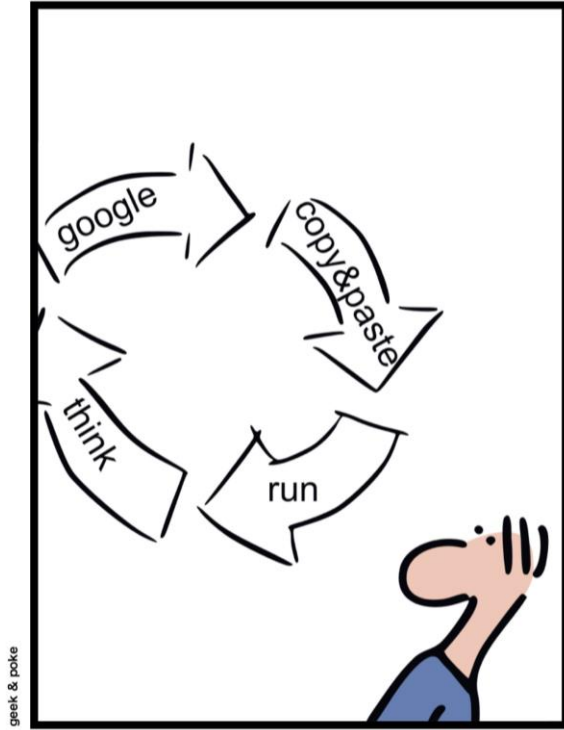




Developers *recognize*  
good practice







*They just don't always get around to putting it into production environments*



*Developers develop bad habits  
because...*



*Old habits die hard...*



Old habits die hard...

# C/SIDE Folder Structure

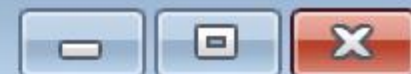
Monkey see, monkey do...

10 YEAR ANNIVERSARY









Table

Page

Report

**Codeunit**

Query

XMLport

MenuSuite

All

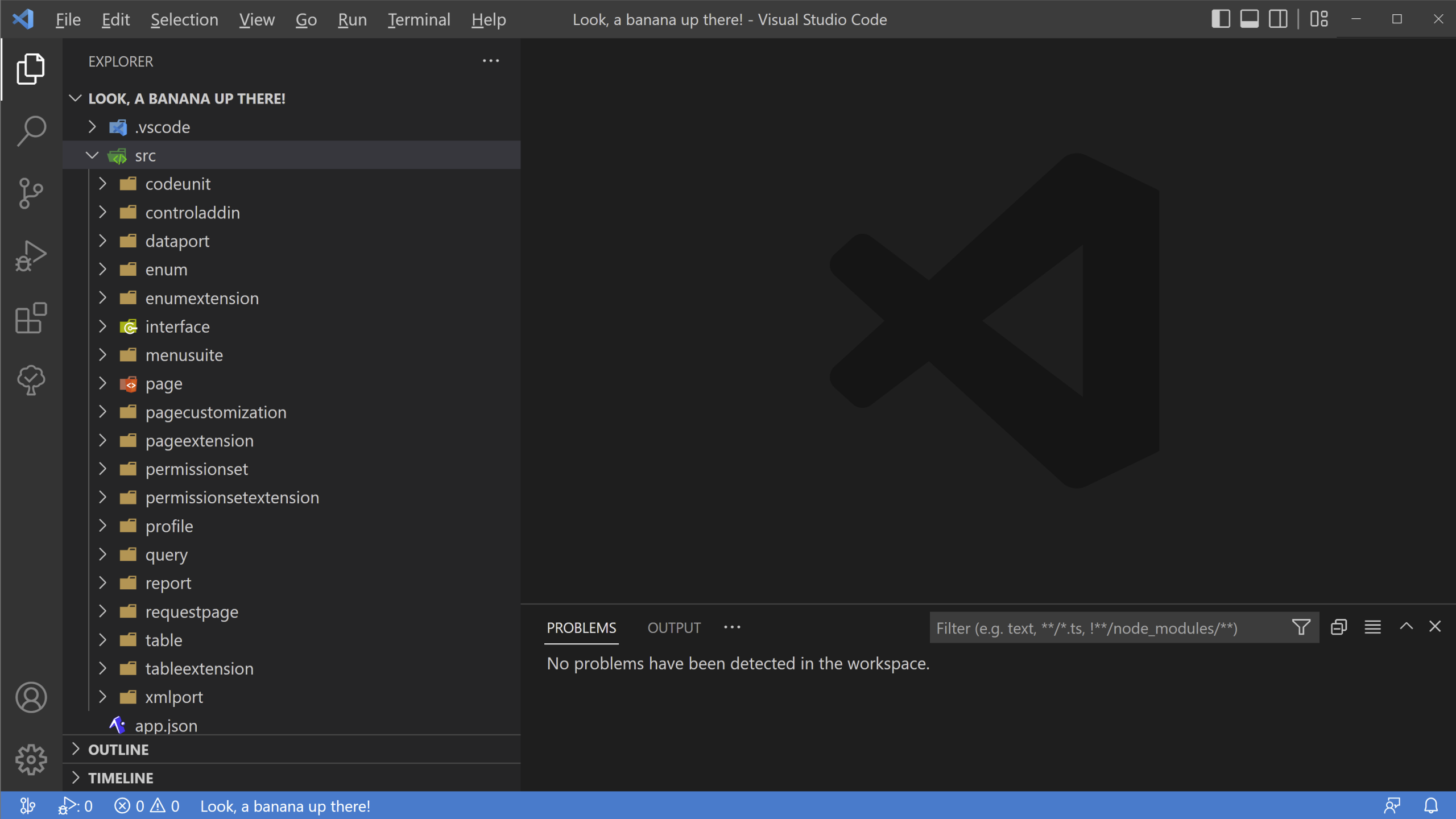
	Type	ID	Name	Modified	Version List	
		131001	Library - Dimension		NAVW111.00.00,Test	^
		131002	Library - Report Validation		NAVW111.00.00,Test	
		131003	Library - Text File Validation		NAVW111.00.00,Test	
		131004	Library - Variable Storage		NAVW111.00.00,Test	
		131007	Library - Report Dataset		NAVW111.00.00,Test	
		131008	Library UT Utility		NAVW111.00.00,Test	
		131009	Library - Setup Storage		NAVW111.00.00,Test	
		131010	Library - Office Host Provider		NAVW111.00.00,Test	
		131011	Library - Post. Prev. Handler		NAVW111.00.00,Test	
		131013	Library - O365 Sync		NAVW111.00.00,Test	
		131014	Library - Booking Manager		NAVW111.00.00,Test	
		131015	Library - Azure AD Auth Flow		NAVW111.00.00,Test	
▶		131020	Library - Azure AD User Mgmt.		NAVW111.00.00,Test	▼

New

Design

Run

Help







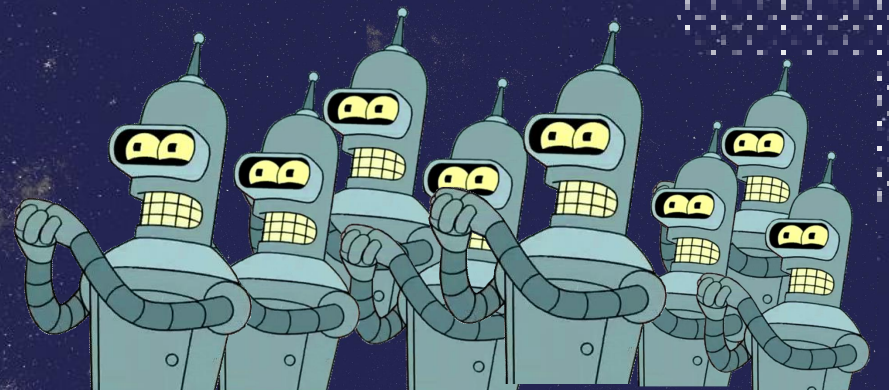


# Numerology

In search of deeper meaning of object IDs...

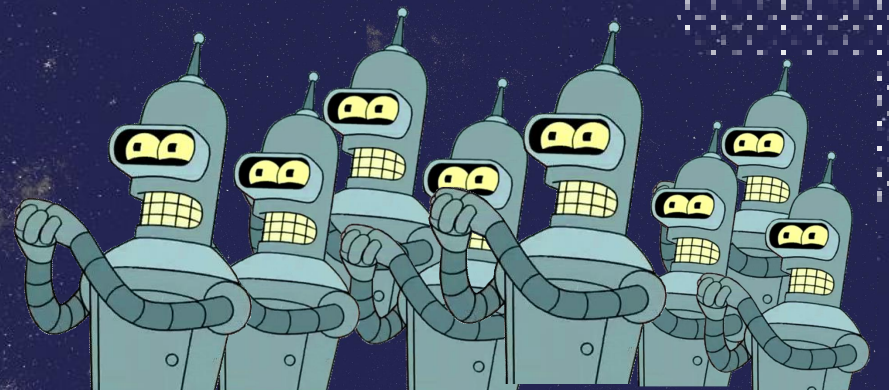


Who thinks Table 18 is  
"Customer"?



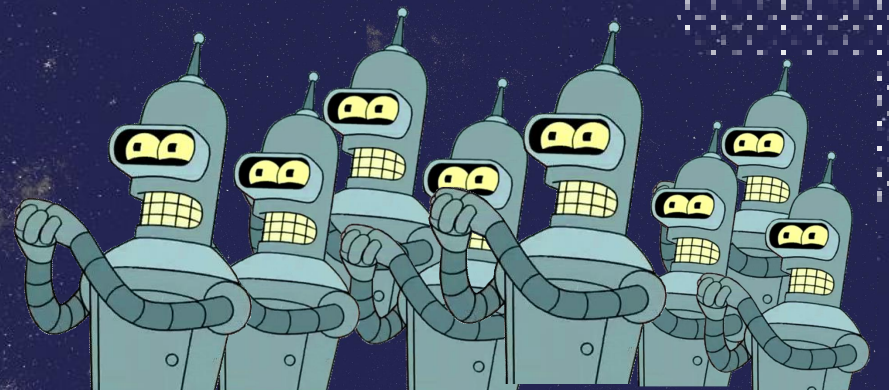


Who thinks Table 27 is  
"Item"?



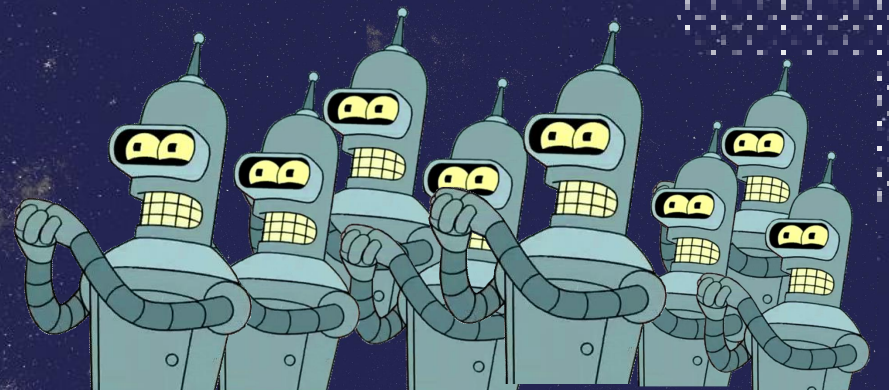


Who thinks Table 333 is  
"Item Ledger Entry"?





What is the number of  
GlobalTriggerManagement?





# This is bad

```
[EventSubscriber(ObjectType::Table, 5619, 'OnAfterDeleteEvent', '', false, false)]  
0 references  
local procedure OnAfterDeleteEvent(var Rec: Record 5619; RunTrigger: Boolean)  
begin  
    if Rec.IsTemporary() then  
        exit;
```

# This is ridiculous

```
var  
    0 references  
    Vend: Record 18;  
    0 references  
    PurchaseHeader: Record 36;  
    0 references  
    PurchasePost: Codeunit 80;
```



# Numerology has many faces

- Object IDs in file names

```
AL Cod50120.BHBadHabitPost.al  
AL Cod50121.BHBadHabitPostLine.al  
AL Pag50120.BHBadHabitSetup.al  
AL Tab50120.BHBadHabitLedgerEntry.al
```

- Compulsive object ranges

Range	Functional Area
50000..50099	General setup and functionality
50100..50199	Sales customizations
50200..50299	Purchases customizations
50300..50499	Finances and G/L customizations

# Numerology has many faces

- Order Fields

```
0 references  
field(1; "Entry No."; Integer) { }  
0 references  
field(10; Street; Text[50]) { }  
0 references  
field(11; "House No."; Integer) { }  
0 references  
field(12; "Post Code"; Code[10]) { }  
0 references  
field(13; City; Text[50]) { }  
0 references  
field(20; "Location Code"; Code[10]) { }
```



**"Old good habits" can very well  
become "bad habits"**

10 YEAR ANNIVERSARY  
10 YEAR ANNIVERSARY

$$AL = C / AL$$

# Just with dark mode, snippets and sh\*t...

10 YEAR ANNIVERSARY



[www.bctechdays.com](http://www.bctechdays.com)



What used to be good, is not necessarily  
still good



# Modification comments

```
// BCTechDays2022 >
// if (xRec."No." <> "No.") and (Quantity <> 0) then begin
//     TestField("Qty. to Asm. to Order (Base)", 0);
//     CalcFields("Reserved Qty. (Base)");
//     TestField("Reserved Qty. (Base)", 0);
//     if Type = Type::Item then
//         WhseValidateSourceLine.SalesLineVerifyChange(Rec, xRec);
//     OnValidateNoOnAfterVerifyChange(Rec, xRec);
// end;
// BCTechDays2022 <
```



# YELLING AT COMPILER

```
procedure DeleteSalesDocs(DocumentType: Enum "Sales Document Type"; CustomerNo: Code[20])
var
    SalesHeader: Record "Sales Header";
    ArchiveMgt: Codeunit ArchiveManagement;
begin
    SalesHeader.SETCURRENTKEY("Document Type", "Bill-to Customer No.");
    SalesHeader.SETRANGE("Document Type", DocumentType);
    SalesHeader.SETRANGE("Bill-to Customer No.", CustomerNo);
    IF NOT SalesHeader.FINDSET() THEN
        REPEAT
            IF SalesHeader.Status = SalesHeader.Status::Open THEN BEGIN
                ArchiveMgt.ArchiveSalesDocument(SalesHeader);
                SalesHeader.DELETE(TRUE);
            END;
        UNTIL SalesHeader.NEXT() = 0;
end;
```



# Mgt codeunits

BC/NAV  
TECH  
DAYS  
2022  
10 YEAR ANNIVERSARY



[www.bctechdays.com](http://www.bctechdays.com)



**No extensibility**



# Creating keys for sorting





# Add SumIndexField just because I have a FlowField

```
key(Key9; "Location Code")  
{  
    MaintainSIFTIndex = false;  
    MaintainSQLIndex = false;  
    SumIndexFields = "Qty. (Base)";  
}
```

The background is a deep blue space scene filled with white stars and faint, glowing nebulae. Several large, semi-transparent red spheres are scattered across the frame. Thin, curved green lines sweep across the lower-left corner. Small, colorful line segments (red, green, blue) are positioned around the central text. In the top right, there is a faint, tilted watermark that reads "10 YEAR ANNIVERSARY".

Comment 'n forget

I'll come back to this later



The background is a deep blue space scene filled with white stars and faint, glowing nebulae. Several large, semi-transparent red spheres are scattered across the frame. Thin, curved lines in shades of teal and purple sweep across the background, adding a sense of motion and depth. The text is centered and rendered in a clean, sans-serif font with a color gradient.

"Good Enough" doesn't mean  
"Good"

10 YEAR ANNIVERSARY

**IT COMPILES**



**SHIP IT!**

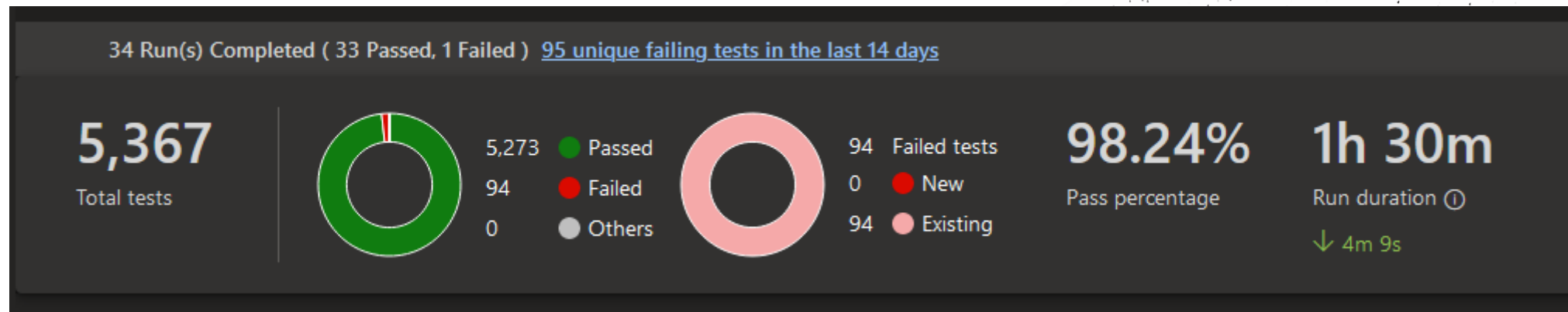


# What is good enough?

- Can somebody else **read** it?
- Can somebody else **maintain** it?
- Does it follow “the **guidelines**”?
- Does it **conflict** with anything else in the system?
- Do we want these **dependencies**?
- Is it **upgradable**?
- ..

# AppSource comes with Maintenance

- New releases in “waves” - every month an update
- There’s a lot that can go wrong ..
- This happened to us after the latest update





# There's a lot that can go wrong

Data changed in the CRONUS database

Obsolescence / Deprecation

- Tables
- Procedures
- Entire functional modules 🤖

Options to enums

Implicit/Explicit Withs

...



# Code Review



A police officer in a dark uniform with a high-visibility yellow vest is shining a flashlight into the driver's side window of a dark-colored car at night. The officer's uniform has a "POLICE" patch on the sleeve. In the background, another officer in a similar vest is visible, and the scene is illuminated by various streetlights and emergency lights. In the foreground, there are orange and white traffic cones and a red octagonal "STOP" sign.

CodeCops

# CodeCops

It's a good practice to comply with as many cops as at all possible.

```
"al.enableCodeAnalysis": true,  
"al.codeAnalyzers": [  
  "${CodeCop}",  
  "${PerTenantExtensionCop}",  
  "${AppSourceCop}",  
  "${analyzerFolder}iFacto.ALCop.dll"  
],
```

```
},  
{  
  "id": "AA0072",  
  "action": "None",  
  "justification": "Name of vars and params must be suffixed. # pointless"  
},  
{  
  "id": "AA0232",  
  "action": "None",  
  "justification": "Flowfield should be added to sift. # Bug in codecop"  
},  
{  
  "id": "AA0235",  
  "action": "None",  
  "justification": "Flowfield should be added to sift. # Bug in codecop"  
}  
]  
}
```



# BC LinterCop



BC Linter Cop

## BusinessCentral.LinterCop

Preview

Stefan Maron | 18,929 installs | ★★★★★ (2) | Free

Provides Linting for the AL Language (Business Central)

Install

[Trouble Installing?](#)

[Overview](#)

[Version History](#)

[Q & A](#)

[Rating & Review](#)

## BusinessCentral.LinterCop

License MIT

This extension provides auto updates for the BusinessCentral.LinterCop. This cop is basically just an dll file and needs to be placed into the folder of the AL vs code extension. If you want to do this manually, you don't need this extension ;)

By default the extension checks if the dll is still there (and did not get deleted due to updates of the AL Extension) and if a new version is released. If one case is true, the latest version of the dll will be downloaded.

In order to activate the LinterCop all you need to do is, to click the `AL Cop` indicator on the bottom bar which shows the active code analyzers for the current settings context:

`AL Cops: Code/UI/PTE/AppSrc`

### Categories

Linters

### Tags

al

Business Central

BusinessCentral

CleanCode

CodeCop

Lint

Lintar

linters

MSDyn365BC

### Works with

Universal

### Resources

[Issues](#)

[Repository](#)

# Implement CI/CD

- Always build against current
- Schedule nightly builds
  - Against NextMinor
  - Against NextMajor
- FAIL the build when you don't comply with the codecops
- WARN for any Next-version

! #7.1.202111.30579 Merge branch 'PREP/NEXTMAJOR' of https://devops.ifa...  
on SALESPURCH ✨ Retained

AL.Analyzer.CodeCop AL.Analyzer.PerTenantExtensionCop AL.Compiler.ALLanguage NEXTMAJOR AL.Analyzer.AppSo

BC.Platform.18.0.22913.0 App.DISTRI-ENV.7.1.202110.30311 App.DISTRI-ENV-TEST.7.1.202110.30311

myimage-sandbox-18.0.22967.0-be-10.0.17763.1518-Its2019 BC.Version.18.0.22967.0 App.DISTRI-EXTTRACK.7.1.202111.30559

App.DISTRI-EXTTRACK-TEST.7.1.202111.30559 App.DISTRI-BASE.7.1.202111.30570 App.DISTRI-BASE-TEST.7.1.202111.30570

App.DISTRI-SALESPURCH.7.1.202111.30579 App.DISTRI-SALESPURCH-TEST.7.1.202111.30579

Summary Tests

## Scheduled

Repositories 2 SALESPURCH , +1  
[See Sources card for details](#)

Time started and elapsed Mar 12, 2021 at 5:00 AM  
56m 4s

Related 0 work items  
1 published; 1 consumed

Tests and coverage 87.7% passed  
[Setup code coverage](#)

## Warnings 115

c:\Run\DevOps\App\Src\INV (Inventory functions)\Import Inventory\INVImportItemJournal.XmlPort.al(159,11)  
ALOps App Compiler

\*\*\* Compile Succeeded with Warnings  
ALOps App Compiler

ASPR Invoice Test:GivenSalesShipment\_Wh  
ALOPS Run TestSuite: SALESPURCH

ASPR Get Price From Quote Test:CheckNot  
ALOPS Run TestSuite: SALESPURCH

c:\Run\DevOps\App\Src\INV (Inventory functions)\Import Inventory\INVImportItemJournal.XmlPort.al(159,11): warning AL0603: An implicit conversion is being performed from a value of type 'Integer' to a value of type 'Enum "Item Ledger Entry Type"'. This conversion can lead to unexpected runtime issues. This warning will become an error in a future release.



# Manual Deployment

10 YEAR ANNIVERSARY

←

Installed Extensions

🔍 Search

Manage

Is Installed	Name	Version
Yes	Application	v. 20.4.44313.44
Yes	Base Application	v. 20.4.44313.46
Yes	Component	v. 20.4.44313.44
Yes	Data Application	v. 20.4.44313.44
Yes	Email Application	v. 20.4.44313.44
Yes	Email Application	v. 20.4.44313.44
Yes	Email Application	v. 20.4.44313.44
Yes	Email Application	v. 20.4.44313.44
Yes	Email Application	v. 20.4.44313.44
Yes	Essential Application	v. 20.4.44313.44
Yes	Intelligent Application	v. 20.4.44313.45
Yes	Reconciliation Application	v. 20.4.44313.44
Yes	Send Application	v. 20.4.44313.44
Yes	System Application	v. 20.4.44313.45

Upload And Deploy Extension

↗ ✕

Upload Extension

Select .app file

...

Deploy Extension

Deploy to

Current version

▼

Language

English (United States)

...

Schema Sync Mode

Add

▼

Accept the privacy policy and t...

☒

Microsoft Business Central PTE Disclaimer

Privacy and Cookies

[Read more about the best practices for installing and publishing extensions](#)

Deploy

Cancel



This is one of the best features that MSDYN 365 Business Central has. Who needs powershell scripts when we got this. 🙌🙌

Upload And Deploy Extension

Upload Extension

Select .app file

Deploy Extension

Deploy to

Language

Schema Sync Mode

Accept the privacy policy and t...

Microsoft Business Central PTE Disclaimer

Privacy and Cookies

Read more about the best practices for installing and publishing extensions

10 YEAR ANNIVERSARY

# Deployment is not just about your app..

Probably – you'll have to manage a set of apps:

- The entire dependency flow
  - Deploy dependencies of your app
  - Deploy the ISV app
  - Build/ Deploy the apps that are dependent from your apps
- Deploy Swagger descriptions of your custom APIs
- Deploy azure functions
- Deploy WebApps
- ...



# Automated deployment

SaaS

OnPrem

Automation App


←

Approval

×

Waiting • Timeout in 29d

Resource

 LIVE

Requirement


All approvers must approve

Waiting on me

Comment (optional)


Reject

Approve

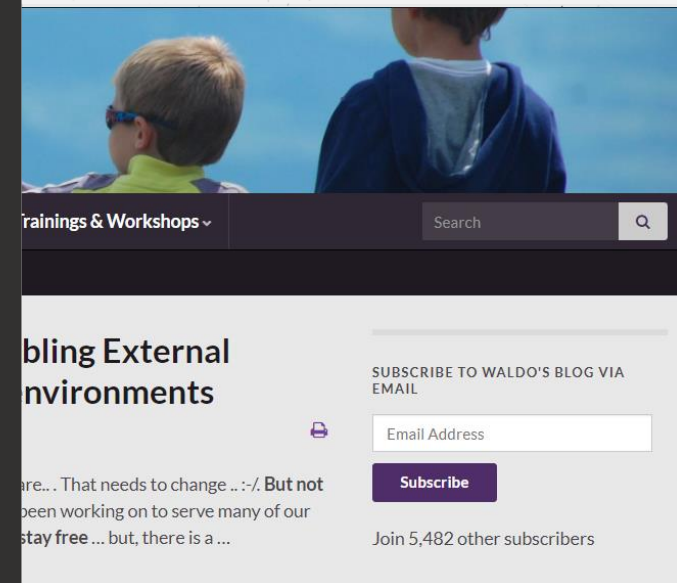
 LA

Waiting

LIVE Approvers



ExternalDeployer



# Not being master of the tool

VSCaaN

10 YEAR ANNIVERSARY



# Not being master of the tool

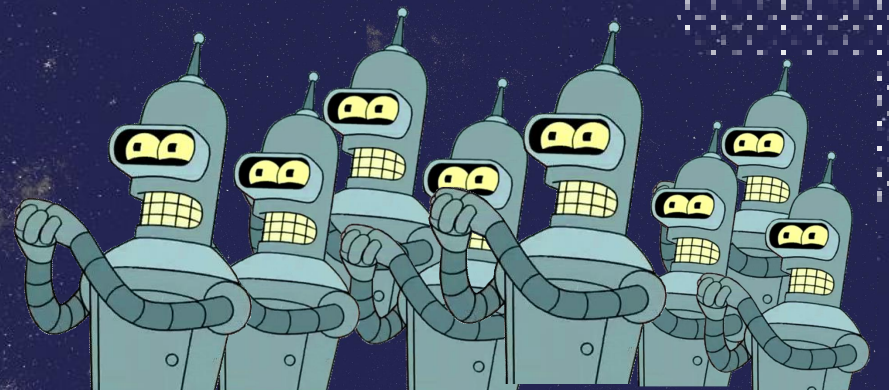
Visual Studio Code as a Notepad



- You Don't Even Think of it?  
- Uh-huh!



Do you use snippets?





# Snippets...

- ... save a lot of time.
  - ... help consistency.
  - ... allow you to focus on the task at hand.
- 
- ... can be per project!

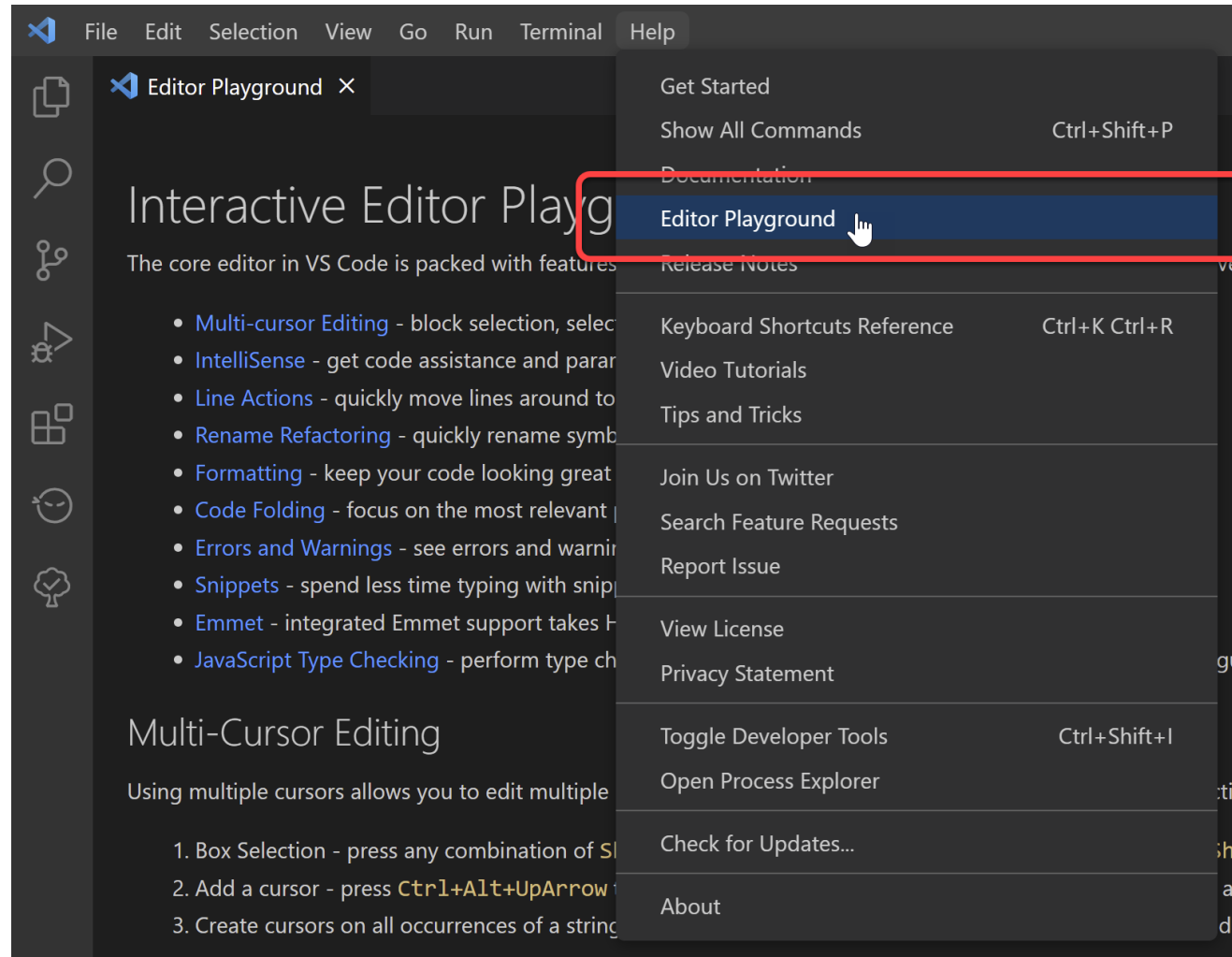
# Keyboard Shortcuts...

- Seasoned C/AL developers took pride into how fast they can keyboard
- Visual Studio Code allows so much more!





# Master the shortcuts



# Conscious Settings management in Visual Studio Code

# Tree layers of settings

- User settings
- Workspace settings
- Folder settings



# Tree layers of settings

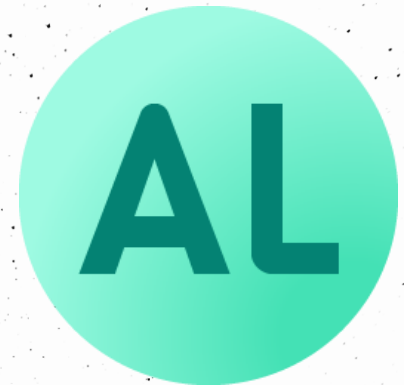
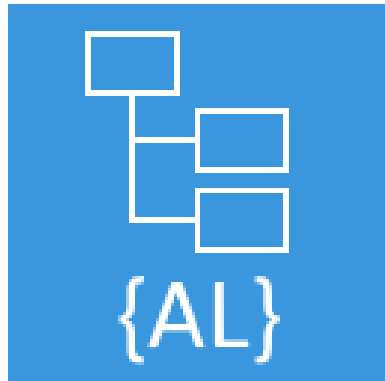
- User settings  
  %appdata%\code\user\settings.json  
  All my projects on this machine
- Workspace settings  
  workspace-file.code-workspace  
  All my projects in this (multi-root) workspace
- Folder settings  
  .vscode\settings.json  
  All my projects on this machine

# Which settings would you want to enforce

- `al.codeAnalyzers`
- `al.enableCodeAnalysis`
- `editor.formatOnSave`
- Specific extensions settings (AL Object ID Ninja, CRS.\*, and similar)
- Settings that do not apply to the app at hand **DO NOT BELONG** in `.vscode\settings.json` (especially user-preference kinds of settings, like themes, icons, etc.)

# Extensions

- Extensions are there to make life easier
- So many good AL extensions out there – take advantage of them!





The background is a dark blue space-themed image. It features a large red sphere in the top left, a smaller red sphere in the bottom right, and another red sphere on the right side. There are several thin, colorful lines (red, green, blue) scattered across the image. A large, faint, curved line is visible on the left side. The text "Comment 'n forget" is centered in a large, bold, sans-serif font. The text "I'll come back to this later" is centered below the first line in a smaller, bold, sans-serif font. The text is colored red and green. In the top right corner, there is a diagonal banner that reads "10 YEAR ANNIVERSARY" in red and green. In the bottom right corner, there is a vertical banner that reads "www.bctechdays.com" in white.

Comment 'n forget

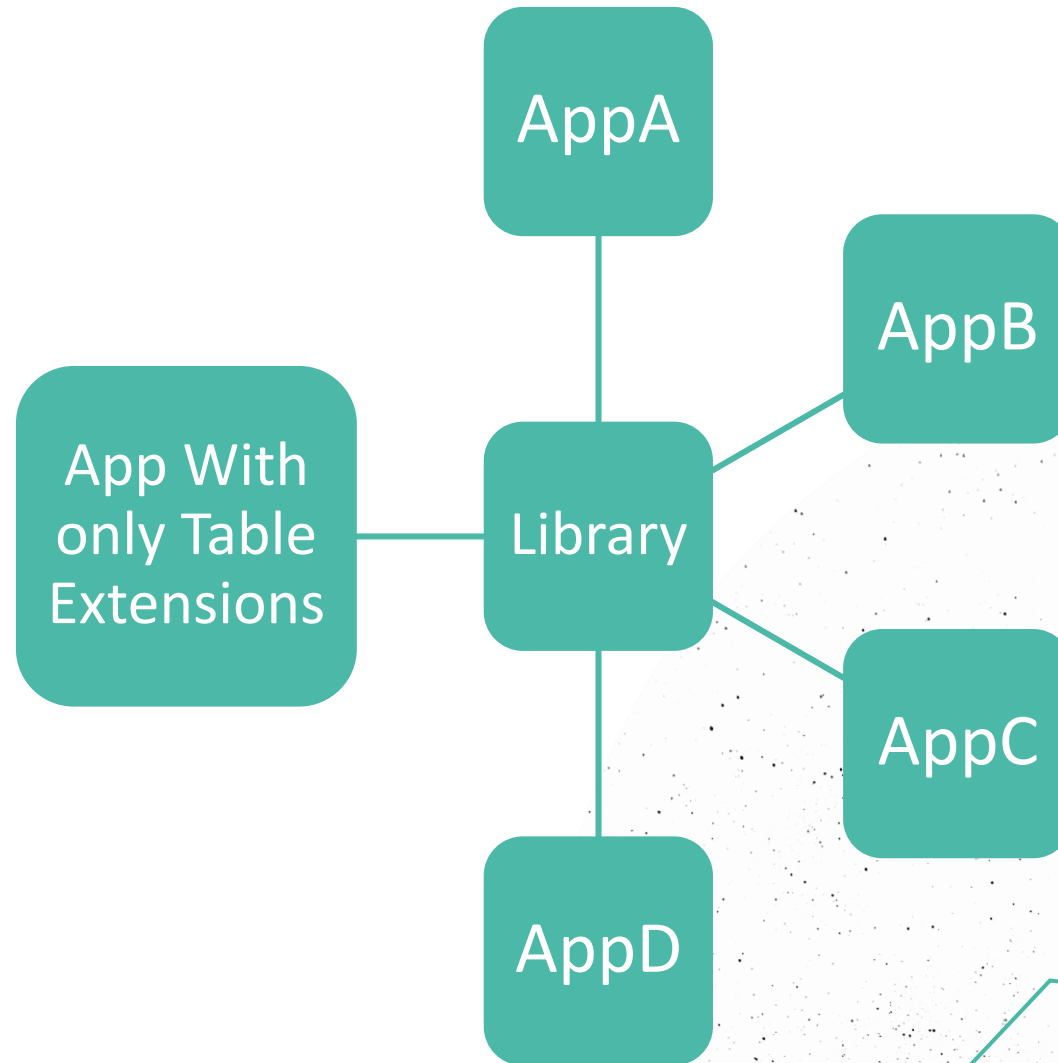
I'll come back to this later

# Table extensions as a design pattern

10 YEAR ANNIVERSARY



# Table extensions as a design pattern





# Table extensions as a design pattern

**Architectural shortcut** to avoid performance problems

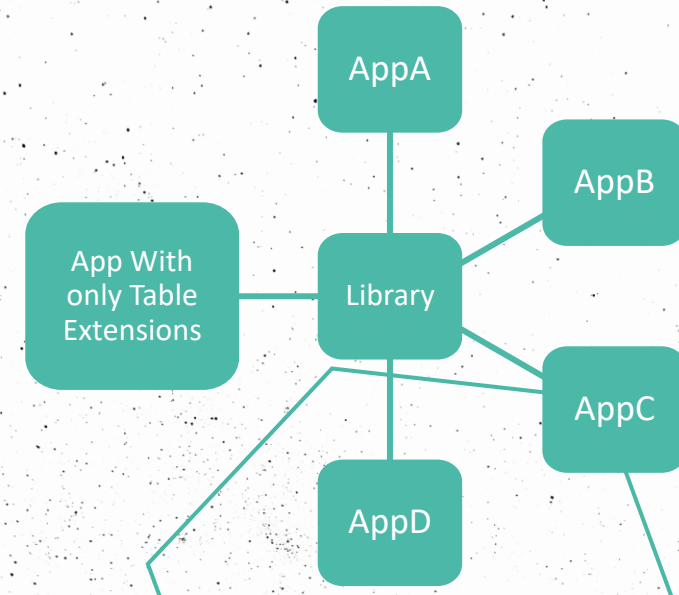
Huge **interdependency** between all apps

Unnecessary fields - **confusion**

Possible **unintentional usages** of fields in wrong apps

Causes **complexity**:

apps have access to all fields, but not all business logic



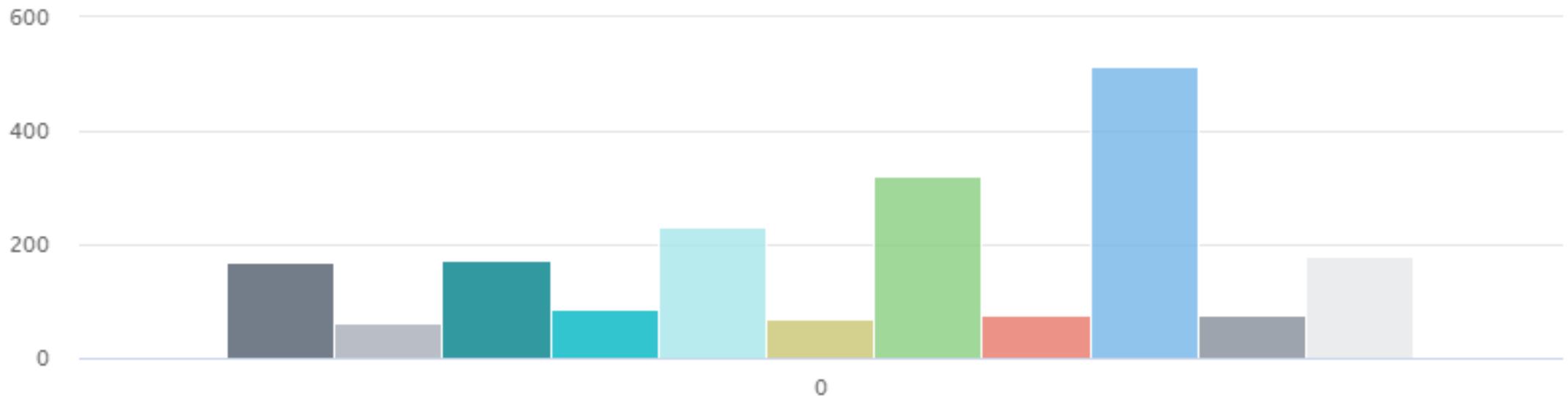
# Partial Records

Averages

Measure

Duration (ms)

- FindSetNoPartialrecords
- Table1\_FindSetWithPartialrecords
- Table3\_FindSetNoPartialrecords
- Table4\_FindSetWithPartialrecords
- FindSetWithPartialrecords
- Table2\_FindSetNoPartialrecords
- Table3\_FindSetWithPartialrecords
- Table4\_JITLoading
- Table1\_FindSetNoPartialrecords
- Table2\_FindSetWithPartialrecords
- Table4\_FindSetNoPartialrecords



It's almost the same as  
Developing Monoliths..

BC/NAV  
TECH  
DAYS  
2022  
10 YEAR ANNIVERSARY



www.bctechdays.com



# Developing Monoliths

10 YEAR ANNIVERSARY

[www.bctechdays.com](http://www.bctechdays.com)

# Monoliths

It's easier on the short term, but harder to maintain on long term

Generally conceived as “Lazy Architecture”

Not a walk in the park:

- Hard to read
- Hard to maintain
- Slow to compile
- Slow for CodeCops
- ...

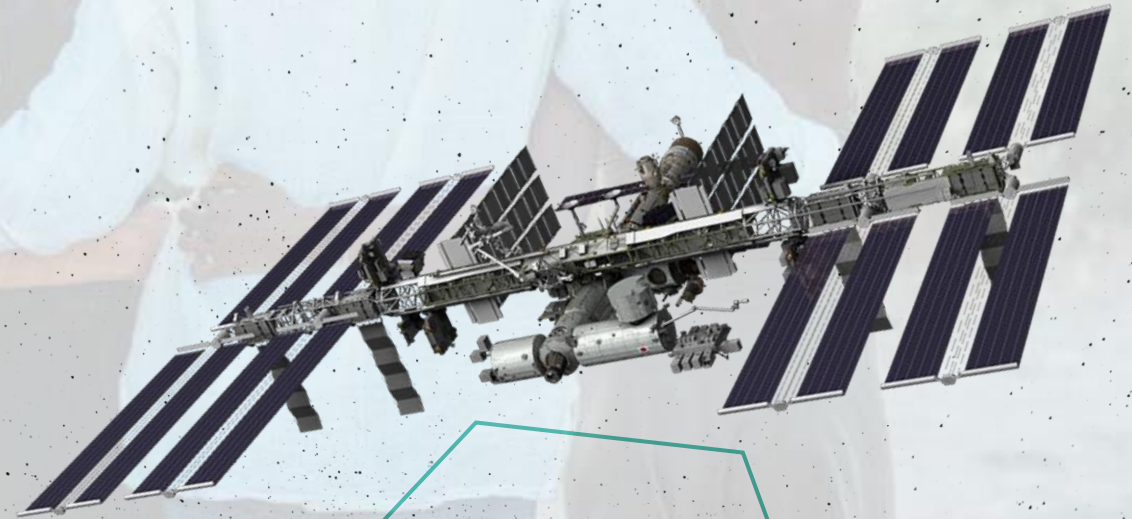
🏠	Overview	
🗂️	Projects	1
🔗	Objects	7189
⚡	Event Publishers	16935
📡	Event Subscribers	1634



# Embrace Dependencies

## Modular Software Design

- Easier to split into multiple teams
- Easier to understand
- Easier to maintain
- Easier to extend
- Easier to test/debug
- Easier to document
- Easier to replace
- ...





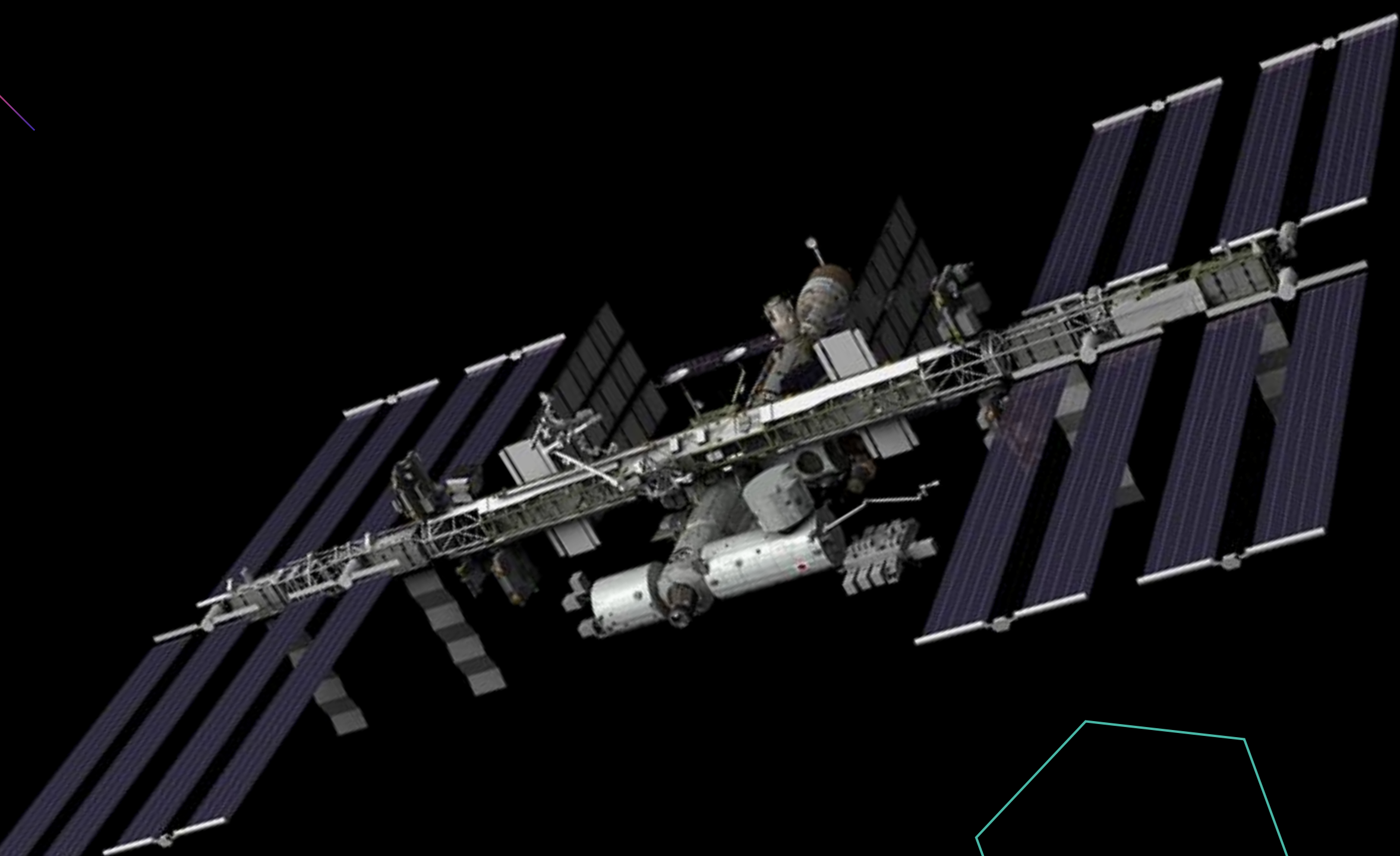
# Manage Dependencies

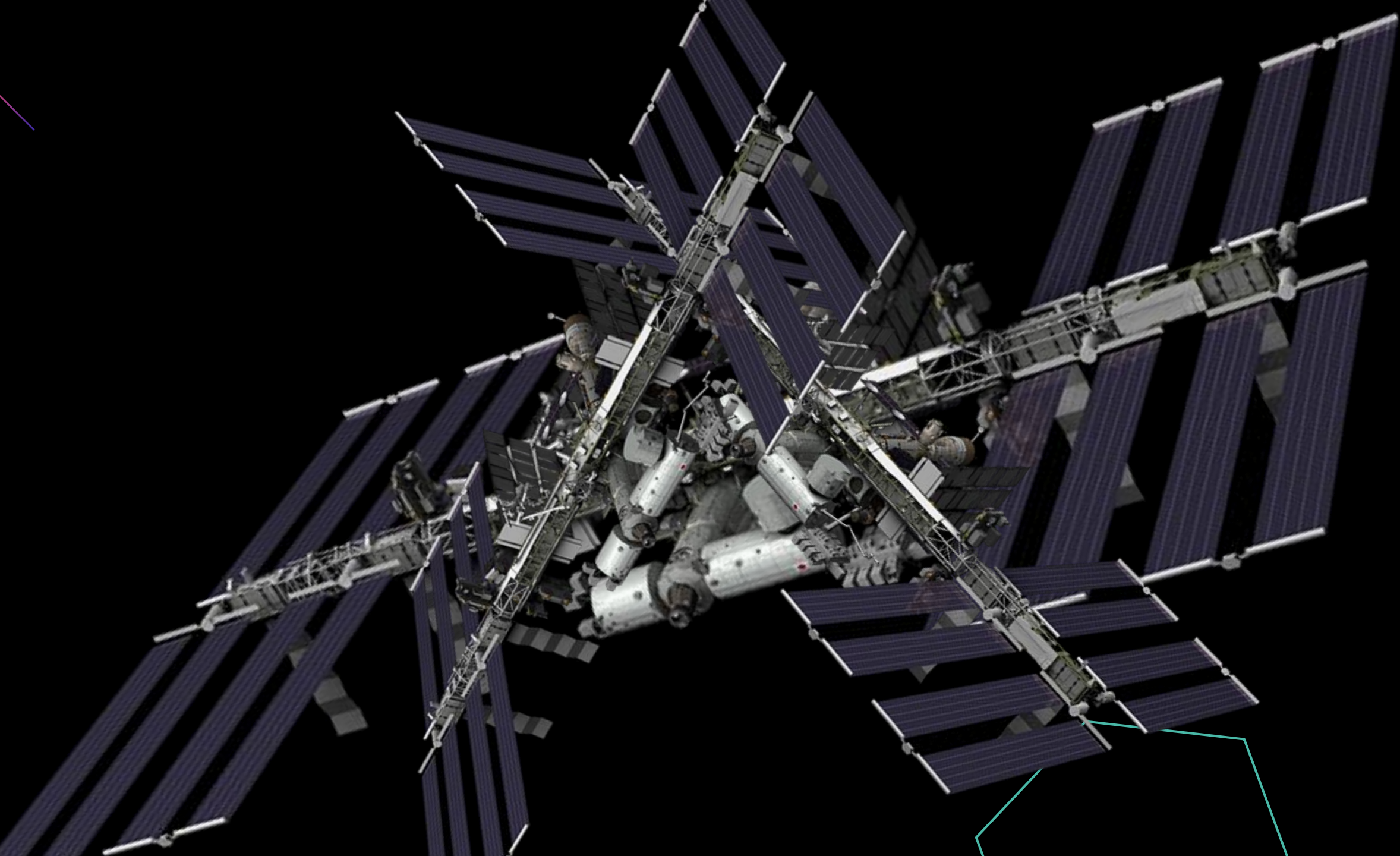
Only create dependencies when

- You really need them
- They make sense
- They don't break the independency of an app

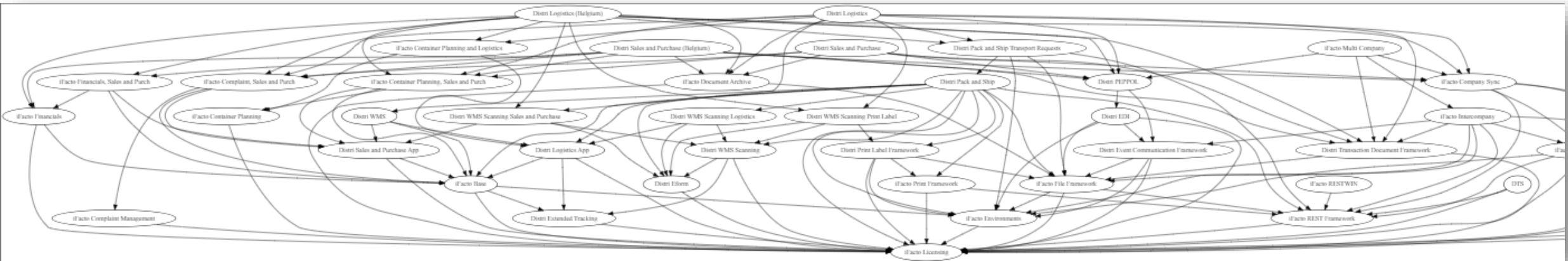
DevOps can help:

- **don't** use an automatic dependency **resolver**
- But **do** use automatic dependency **deployer**









# azure-pipelines.yml

Edit



Contents History Compare Blame



```
36 # - template: .tasks/PublishApp/iFactoBusinessSolutionsNV/DistriApps/BASE_TEST.yml@template:
37
38 - template: .tasks/PublishApp/iFactoBusinessSolutionsNV/DistriApps/LICENSING.yml@templates
39 - template: .tasks/PublishApp/iFactoBusinessSolutionsNV/DistriApps/LICENSING_TEST.yml@templ
40
41 ### Compile App
42 - template: .devops/supercompile.yml@templates
43
44 ### Initialize Container
```



90 MIN

SESSION

LEVEL: 200 - INTERMEDIATE

ROOM 9

## Multi-Application Architecture

Everyone is producing their Extensions/Apps and we are mostly driven by our intuition when to create new app or use existing one. It is time to bring some rules into this process.

### Speaker(s)

Kamil Sáček



Jeremy Vyska





# Mindless coding

10 YEAR ANNIVERSARY

A chimpanzee is depicted in a professional setting, wearing a light blue button-down shirt and a red tie with white polka dots. The chimpanzee is seated at a dark, reflective desk, holding a silver tablet with both hands. It has a wide, toothy grin, showing its teeth. The background is a plain, light-colored wall.

Mindless coding



# ApplicationArea on fields defaults to page value

Article • 08/22/2022 • 2 minutes to read • 2 contributors



## Important

Some of the functionality described in this release plan has not been released. Delivery timelines may change and projected functionality may not be released (see [Microsoft policy](#)). Learn more: [What's new and planned](#)

Enabled for	Public preview	General availability
Admins, makers, marketers, or analysts, automatically	Sep 2022	Oct 2022

## Business value

Application areas represent a feature in the system that offers developers, administrators, and users the ability to define differentiated user experiences.

Contender #1 for

10 YEAR ANNIVERSARY



feature ever" prize

www.bctechdays.com



# ApplicationArea on fields defaults to page value

Article • 08/22/2022 • 2 minutes to read • 2 contributors

## Important

Some of the functionality described in this release plan has not been released. Delivery timelines may change and projected functionality may not be released (see [Microsoft policy](#)). Learn more: [What's new and planned](#)

### Enabled for

Admins, makers, marketers, or analysts, automatically

### Public preview

Sep 2022

### General availability

Oct 2022

## Business value

Application areas represent a feature in the system that offers developers, administrators, and users the ability to define differentiated user experiences

```
1 page 64001 "CustomerA BAH"
2
3 Caption = 'Customer';
4 PageType = Card;
5 SourceTable = Customer;
6
7 layout
8 {
9     0 references
10    area(content)
11    {
12        0 references
13        group(General)
14        {
15            0 references
16            field(Address; Rec.Address)
17            {
18                ApplicationArea = All;
19                Tooltip = 'Specifies the customer's address. This address will appear on al
20            }
21            0 references
22            field("Address 2"; Rec."Address 2")
23            {
24                ApplicationArea = All;
25                Tooltip = 'Specifies additional address information.';
26            }
27            0 references
28            field("Allow Line Disc."; Rec."Allow Line Disc.")
29            {
30                ApplicationArea = All;
31                Tooltip = 'Specifies if a sales line discount is calculated when a special s
32            }
33            0 references
34            field(Amount; Rec.Amount)
35            {
36                ApplicationArea = All;
37                Tooltip = 'Specifies the value of the Amount field.';
38            }
39            0 references
40            field("Application Method"; Rec."Application Method")
41            {
42                ApplicationArea = All;
43                Tooltip = 'Specifies how to apply payments to entries for this customer.';
44            }
45        }
46    }
47 }
```

```

1 page 64001 "CustomerA BAH"
2
3 Caption = 'Customer';
4 PageType = Card;
5 SourceTable = Customer;
6
7 layout
8 {
9     0 references
10    area(content)
11    {
12        0 references
13        group(General)
14        {
15            0 references
16            field(Address; Rec.Address)
17            {
18                ApplicationArea = All;
19                Tooltip = 'Specifies the customer's address. This address will appear on all cards and reports for this customer.';
20            }
21            0 references
22            field("Address 2"; Rec."Address 2")
23            {
24                ApplicationArea = All;
25                Tooltip = 'Specifies additional address information.';
26            }
27            0 references
28            field("Allow Line Disc."; Rec."Allow Line Disc.")
29            {
30                ApplicationArea = All;
31                Tooltip = 'Specifies if a sales line discount is calculated when a special price is applied to a line item.';
32            }
33            0 references
34            field(Amount; Rec.Amount)
35            {
36                ApplicationArea = All;
37                Tooltip = 'Specifies the value of the Amount field.';
38            }
39        }
40    }
41 }

```

```

1 page 64002 "CustomerB BAH"
2
3 Caption = 'Customer';
4 PageType = Card;
5 SourceTable = Customer;
6 ApplicationArea = All;
7
8 layout
9 {
10     0 references
11    area(content)
12    {
13        0 references
14        group(General)
15        {
16            0 references
17            field(Address; Rec.Address)
18            {
19                Tooltip = 'Specifies the customer's address. This address will appear on all cards and reports for this customer.';
20            }
21            0 references
22            field("Address 2"; Rec."Address 2")
23            {
24                Tooltip = 'Specifies additional address information.';
25            }
26            0 references
27            field("Allow Line Disc."; Rec."Allow Line Disc.")
28            {
29                Tooltip = 'Specifies if a sales line discount is calculated when a special price is applied to a line item.';
30            }
31            0 references
32            field(Amount; Rec.Amount)
33            {
34                Tooltip = 'Specifies the value of the Amount field.';
35            }
36            0 references
37            field("Application Method"; Rec."Application Method")
38            {
39                Tooltip = 'Specifies how to apply payments to entries for this customer.';
40            }
41            0 references
42            field(Balance; Rec.Balance)
43            {
44                Tooltip = 'Specifies the value of the Balance field.';
45            }
46        }
47    }
48 }

```

BC/NAV  
TECH  
DAYS  
2022  
10 YEAR ANNIVERSARY



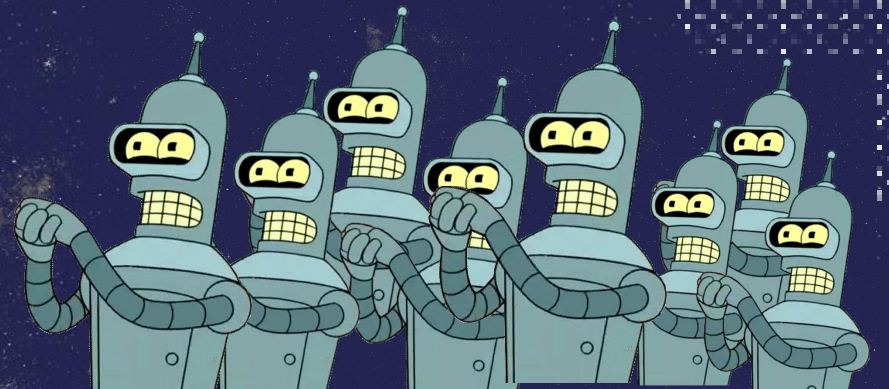
ApplicationArea = All

Contender #1 for "The most useless language feature ever" prize

www.bctechdays.com



Who of you ALWAYS uses "All" as  
Application Area?



# ApplicationArea actually has a purpose

- Differentiate user experience by hiding irrelevant
  - Fields
  - Actions
  - ..
- You should:
  - Extend ApplicationAreas with your own (if it makes sense in your solution)
  - Use the existing out-of-the-box ApplicationAreas

```
addafter("Location Code")
{
    field("Location 2 BAH"; Rec."Location 2 BAH")
    {
        ApplicationArea = Location;
    }
}
```

# Not thinking about Tooltips

Contender #2 for “Most useless language feature ever” award

BC/NAV  
TECH  
DAYS  
2022  
10 YEAR ANNIVERSARY



www.bctechdays.com



# Why?

NOT because Tooltips are useless  
But we MAKE them useless

```
field(ISBN; Rec.ISBN)
{
    ApplicationArea = All;
    ToolTip = 'Specifies the value of the ISBN field.';
}
```

> tooltips

AZ AL Dev Tools: Add **ToolTips** to the Active Editor

AZ AL Dev Tools: Refresh **ToolTips** from Dependencies in the Active Editor

AZ AL Dev Tools: Add **ToolTips** to the Active Project

AZ AL Dev Tools: Refresh **ToolTips** from Dependencies in the Active Project

# To Validate or not to Validate, that is the question

... or not?

10 YEAR ANNIVERSARY



www.bctechdays.com





**Stefan Maroń** @StefanMaron · Sep 6

...

The amount of code I see that doesn't run field validation or insert/modify triggers is unbelievable. Usually the reason is „because there is no validation/trigger code“



**Stefan Maroń** @StefanMaron · Sep 6

...

I often fail to convince people that it still make sense to do validation because the code could be added later by new version or other extensions



**Arend-Jan Kauffmann** @ajkauffmann · Sep 6

...

Is this a topic for the habits session of @waldo and @vjekob? The question is to validate or not to validate fields.



**Vjekoslav Babic** @vjekob · Sep 7

...

Hmmm... a good idea 😊 I think we should talk about that.



**Stefan Maroń** @StefanMaron · Sep 6

The amount of code I see that doesn't run field validation or insert/modifv triggers is unbelievable. Usually the reason is „because there is no validation/trigger code“



**Stefan Maroń** @StefanMaron · Sep 6

I often fail to convince people that it still make sense to do validation because the code could be added later by new version or other extensions



**Arend-Jan Kauffmann** @ajkauffmann · Sep 6

Is this a topic for the habits session of @waldo and @vjekob? The c is to validate or not to validate fields.



**Vjekoslav Babic** @vjekob · Sep 7

Hmmm... a good idea 😊 I think we should talk about that.



**waldo** @waldo1001 · Sep 7

Always validate - there - we talked about it 🤪



**Stefan Maroń** @StefanMaron · Sep 7

Replying to @waldo1001 @vjekob and 5 others



# It's not that simple...

- ... but not that complicated, either

```
field(50; Quantity; Decimal)
{
    Caption = 'Quantity';

    trigger OnValidate()
    begin
        PreValidateSomeImportantQuantityStuff();
        Rec.Validate("Quantity Base", Rec.Quantity / Rec."Quantity Per");
        ValidateSomeImportantQuantityStuff();
    end;
}
```

```
field(51; "Quantity Base"; Decimal)
{
    Caption = 'Quantity Base';

    trigger OnValidate()
    begin
        PreValidateSomeImportantQuantityBaseStuff();
        Rec.Validate(Quantity, Rec."Quantity Base" * Rec."Quantity Per");
        ValidateSomeImportantQuantityBaseStuff();
    end;
}
```



# It's not that simple...

- ... but not that complicated, either

```
field(50; Quantity; Decimal)
{
    Caption = 'Quantity';

    trigger OnValidate()
    begin
        PreValidateSomeImportantQuantityStuff();

        if (CurrFieldNo <> Rec.FieldNo("Quantity Base")) then
            Rec.Validate("Quantity Base", Rec.Quantity / Rec."Quantity Per");

        ValidateSomeImportantQuantityStuff();
    end;
}
```

```
field(51; "Quantity Base"; Decimal)
{
    Caption = 'Quantity Base';

    trigger OnValidate()
    begin
        PreValidateSomeImportantQuantityBaseStuff();

        if (CurrFieldNo <> Rec.FieldNo(Quantity)) then
            Rec.Validate(Quantity, Rec."Quantity Base" * Rec."Quantity Per");

        ValidateSomeImportantQuantityBaseStuff();
    end;
}
```

# Pure functions

```
procedure GetWeatherForecast(City: Text) Result: JsonObject;  
var  
    Client: HttpClient;  
    Response: HttpResponseMessage;  
    Output: Text;  
begin  
    Client.Get(StrSubstNo('https://weather.dummy/forecast/%1', City), Response);  
    Response.Content.ReadAs(Output);  
    Result.ReadFrom(Output);  
end;
```

# Impure functions

Side  
effects

```
procedure GetWeatherForecast(City: Text) Result: JsonObject;  
var  
    Client: HttpClient;  
    Response: HttpResponseMessage;  
    Output: Text;  
begin  
    LogHttpCall("Http Call Type"::Forecast);  
  
    Client.Get(StrSubstNo('https://weather.dummy/forecast/%1', City), Response);  
    Response.Content.ReadAs(Output);  
    Result.ReadFrom(Output);  
  
    StoreForecast(City, Result);  
end;
```

- Anything that invokes events is impure (which is all `Record.Validate`)



# Mindless about impure functions

- Invoking impure functions without being aware of side effects is mindless

# Don't be mindless about validations

- Routinely not invoking `Record.Validate` is mindless (because all of them have side effects, even when you don't directly see them)
- Mindlessly invoking `Record.Validate` could be dangerous (...but it shouldn't be!)
- Writing code that's not validate-proof is... as mindless as it gets
- Other extensions will call your validate triggers!

There is no “low code”, it’s just  
someone else’s code

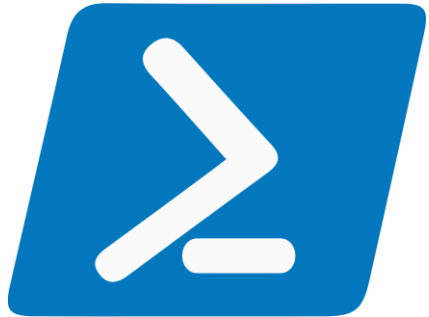
BC/NAV  
TECH  
DAYS  
2022  
10 YEAR ANNIVERSARY



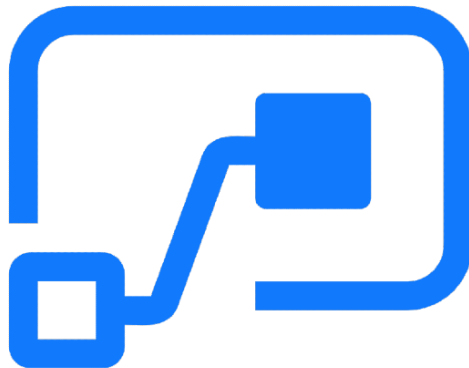
www.bctechdays.com



Microsoft  
PowerApps



Power BI



Power Automate

# Think..

Before you start using these services as part of your solution

Is it going to be **reusable**?

Is this PowerApp part of my **ISV solution**?

What if the customer wants **customization**?

Is this PowerBI report dependent on a certain **version** of my product?

What happens if I **upgrade**?

How do I do **version management**?

How will we **support** this?

How does **deployment** work? To all users?...







10 YEAR ANNIVERSARY

*"Low Code has the Ratatouille problem.  
Yes, absolutely, "Everyone can cook", and should! But,  
knowing how to make a good meal doesn't mean you know  
how to run a restaurant with proper health and hygiene  
standards"*

*- Jeremy Vyska -*

"NO" DOES  
NOT MEAN  
"CONVINCE  
ME"

**Not minding Permission Sets**





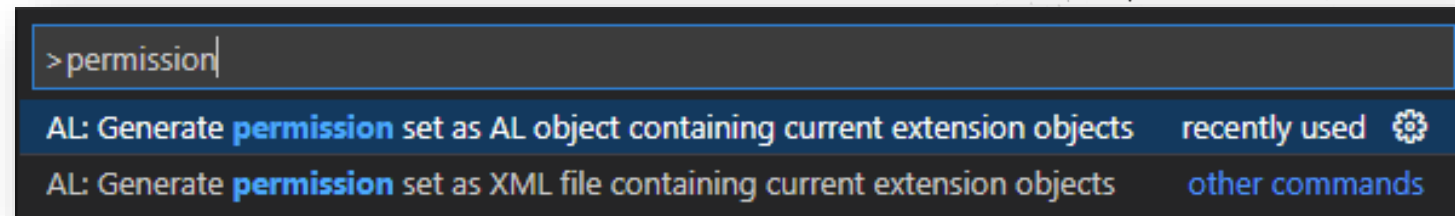


# The worst command was ...

```
>permissi
```

```
AL: Generate permission set containing current extension objects
```

# The two worst commands are ...



permissionset 2039072 GeneratedPermission

```
{  
    Assignable = true;  
    Permissions = tabledata "AAI Argument"=RIMD,  
        tabledata "AAI Codeunit"=RIMD,  
        tabledata "APPD PurchPrice Sorting Buffer"=RIMD,  
        tabledata "APPD PurchPrice&Line Disc Buff"=RIMD,  
        tabledata "CASHR Cash Register"=RIMD,  
        tabledata "CASHR Cash Register Cue"=RIMD,  
        tabledata "CASHR Cash Register Setup"=RIMD,  
        tabledata "CASHR Payment Method"=RIMD,  
        tabledata "CASHR Personal User ID"=RIMD,  
        tabledata "CASHR Sales Paym. Line Log"=RIMD,  
        tabledata "CASHR Sales Paym. Link Docs"=RIMD,  
        tabledata "CASHR Sales Payment Line"=RIMD,  
        tabledata "Cost Code ITCIFC"=RIMD,  
        tabledata "CSH Comb. Ship. Run Setup"=RIMD,  
        tabledata "EIT Export Item"=RIMD,  
        tabledata "INP Packer"=RIMD,  
        tabledata "INP Picker"=RIMD,  
        tabledata "INP Process Backorder Line"=RIMD,  
        tabledata "INP Warehouse Process Log"=RIMD,  
        tabledata "ISUP Item Supplement"=RIMD,  
        tabledata "ITAX Item Tax"=RIMD,  
        tabledata "ITAX Line Number Buffer"=RIMD,  
        tabledata "ITAX Purch. Tax Buffer"=RIMD,  
        tabledata "ITAX Tax"=RIMD,  
        tabledata "ITAX Tax Price"=RIMD,
```



# Permission Sets

- We need to give the ability for users to assign proper permissions
- THINK about your permissions.

For example:

```
permissionset 2040390 "EDII_ADMIN"
{
    Access = Public;
    Assignable = true;
    Caption = 'EDI Admin';
    Permissions = tabledata "EDII DP File Interface" = RIMD,
    tabledata "EDII Envelope Header" = RIMD,
    tabledata "EDII Envelope Line" = RIMD,
    tabledata "EDII Partner" = RIMD,
    tabledata "EDII Partner Message" = RIMD,
    tabledata "EDII Setup" = RIMD,
    tabledata "EDII Setup Log" = RIMD;
}
```

```
permissionset 2040391 "EDII_USER"
{
    Access = Public;
    Assignable = true;
    Caption = 'EDI User';
    Permissions = tabledata "EDII DP File Interface" = R,
    tabledata "EDII Envelope Header" = RI,
    tabledata "EDII Envelope Line" = RI,
    tabledata "EDII Partner" = RI,
    tabledata "EDII Partner Message" = RI,
    tabledata "EDII Setup" = RI,
    tabledata "EDII Setup Log" = RI;
}
```

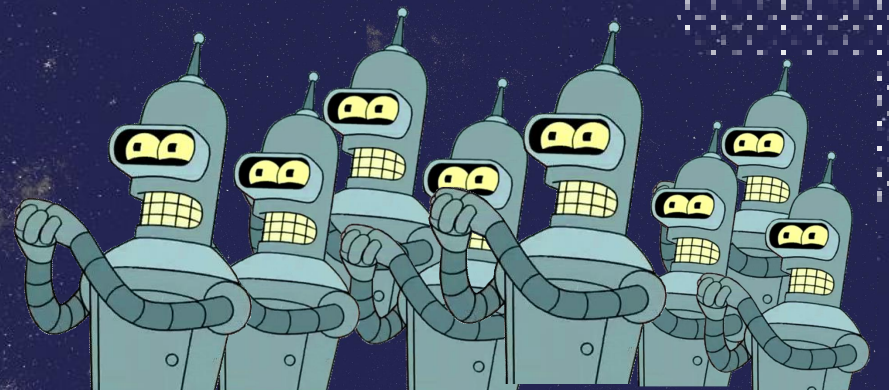
The background is a deep blue space scene filled with white stars and faint, glowing galaxies. Several large, semi-transparent red spheres are scattered across the frame. Thin, curved green lines and short, straight purple and red line segments are also present, adding a geometric feel to the cosmic theme.

# No Testability

10 YEAR ANNIVERSARY



Is “testability” a good habit?

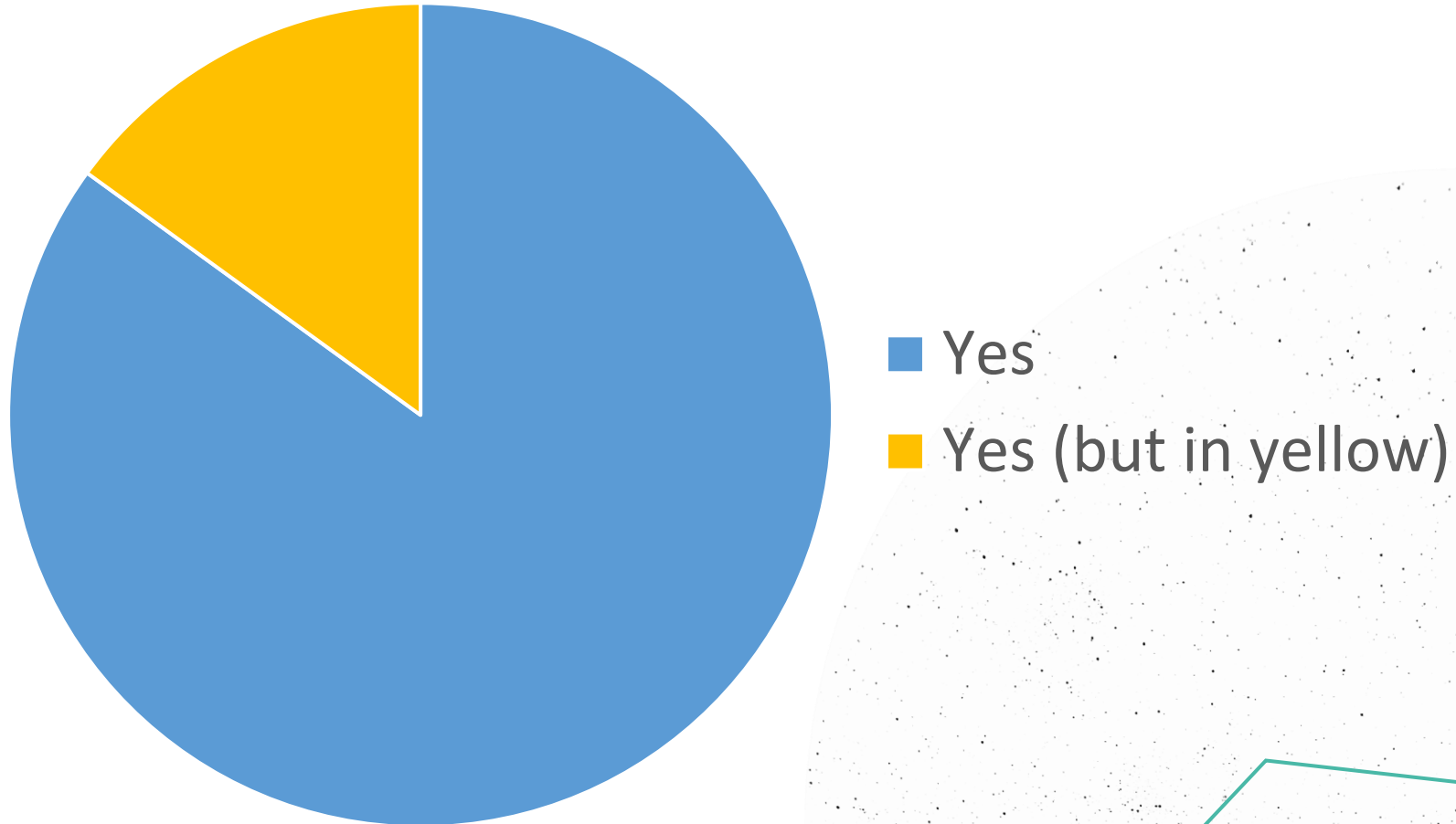




# Is “testability” a good habit?

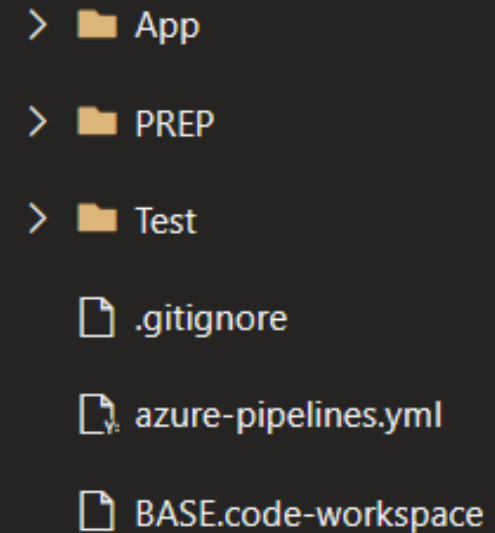
Crunching numbers....

# Is “testability” a good habit?



# Unit Testing

- Each individual app has its test app
- Install-codeunit to install apps
- Only test the app that is being built



```
> App
> PREP
> Test
.gitignore
azure-pipelines.yml
BASE.code-workspace
```

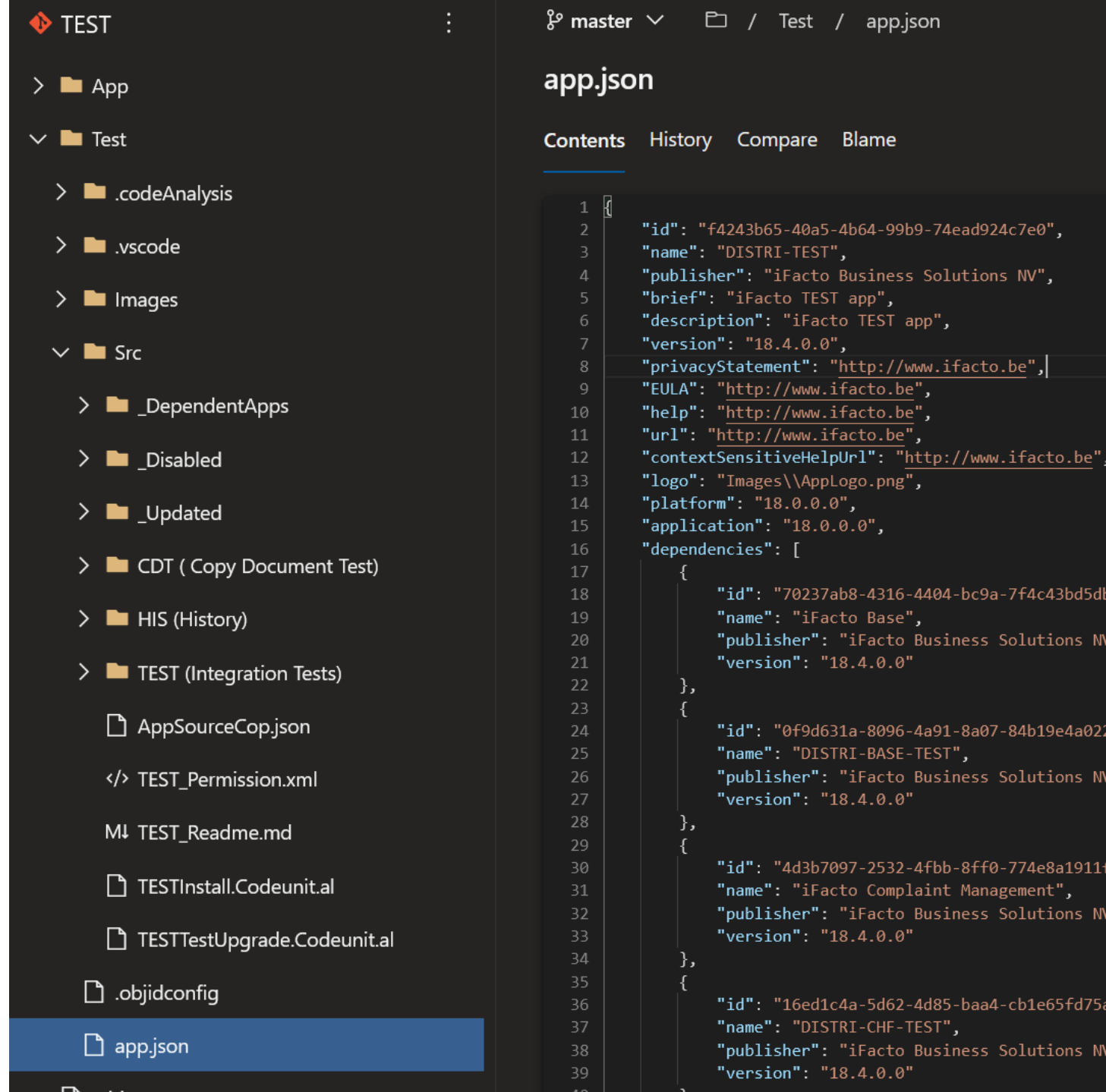


# Integration testing



# Integration testing

- Separate App
- Runs all Unit tests
  - this time not isolated, but when integrated
  - test the app combinations
- Provide mechanism to “replace” tests
- Schedule pipeline



The screenshot shows a code editor interface. On the left is a file explorer with the following structure:

- TEST
  - App
  - Test
    - .codeAnalysis
    - .vscode
    - Images
    - Src
      - \_DependentApps
      - \_Disabled
      - \_Updated
      - CDT ( Copy Document Test)
      - HIS (History)
      - TEST (Integration Tests)
        - AppSourceCop.json
        - TEST\_Permission.xml
        - TEST\_Readme.md
        - TESTInstall.Codeunit.al
        - TESTTestUpgrade.Codeunit.al
    - .objidconfig
    - app.json (selected)

On the right, the content of the selected `app.json` file is displayed:

```
{
  "id": "f4243b65-40a5-4b64-99b9-74ead924c7e0",
  "name": "DISTRI-TEST",
  "publisher": "iFacto Business Solutions NV",
  "brief": "iFacto TEST app",
  "description": "iFacto TEST app",
  "version": "18.4.0.0",
  "privacyStatement": "http://www.ifacto.be",
  "EULA": "http://www.ifacto.be",
  "help": "http://www.ifacto.be",
  "url": "http://www.ifacto.be",
  "contextSensitiveHelpUrl": "http://www.ifacto.be",
  "logo": "Images\\AppLogo.png",
  "platform": "18.0.0.0",
  "application": "18.0.0.0",
  "dependencies": [
    {
      "id": "70237ab8-4316-4404-bc9a-7f4c43bd5d",
      "name": "iFacto Base",
      "publisher": "iFacto Business Solutions NV",
      "version": "18.4.0.0"
    },
    {
      "id": "0f9d631a-8096-4a91-8a07-84b19e4a02",
      "name": "DISTRI-BASE-TEST",
      "publisher": "iFacto Business Solutions NV",
      "version": "18.4.0.0"
    },
    {
      "id": "4d3b7097-2532-4fbb-8ff0-774e8a1911",
      "name": "iFacto Complaint Management",
      "publisher": "iFacto Business Solutions NV",
      "version": "18.4.0.0"
    },
    {
      "id": "16ed1c4a-5d62-4d85-baa4-cb1e65fd75",
      "name": "DISTRI-CHF-TEST",
      "publisher": "iFacto Business Solutions NV",
      "version": "18.4.0.0"
    }
  ]
}
```

# When a test fails in the integration test, but should succeed

1. Disable the test in the original app
2. Copy the test to the IntegrationTest-app
3. Fix it

```
codeunit 93064 "EDI Disable/Update Subs"    Gunter Peeters, 2 years ago • EDI Test Fix ...  
[EventSubscriber(ObjectType::Codeunit, Codeunit::"TEST Disable Tests", 'OnDiscoverDisabledTests', '', false, false)]  
local procedure DisableEDITest(sender: Codeunit "TEST Disable Tests")  
var  
    UpdatedTestsMeth: Codeunit "TEST Updated Tests Meth";  
begin  
    sender.DisableTest(codeunit::"EDII Test", 'CreateCustomerAndSetAsEDIPartnerThenPostShipmentAndInvoiceAndCheckECFQue  
    sender.DisableTest(codeunit::"EDII Test", 'ProcessQueueDeliveryProviderFile');  
  
    UpdatedTestsMeth.ValidateTestIsUpdated(Codeunit::"EDII Test Ext", Codeunit::"EDII Test", 'CreateCustomerAndSetAsEDI  
    UpdatedTestsMeth.ValidateTestIsUpdated(Codeunit::"EDII Test Ext", Codeunit::"EDII Test", 'ProcessQueueDeliveryProvi  
end;  
}
```



# Recommendation

ATDD: Build “Testability” into the **core of your development** process

Make sure you don’t “just” do unit tests, or “just” do integration tests. You need input from both.



Comment 'n forget

I'll come back to this later

10 YEAR ANNIVERSARY

If it's hard in ai, it probably  
doesn't belong in ai

10 YEAR ANNIVERSARY









$$\begin{aligned} & M \begin{pmatrix} X \\ Y \\ Z \end{pmatrix} \rightarrow M \begin{pmatrix} X + 0 \\ Y + 0 \\ Z + 1 \end{pmatrix} \\ & p = \frac{1}{3} m_0 n \bar{v}^2 = \frac{2}{3} n \bar{E}_k = \frac{1}{3} \rho \bar{v}^2 = nkT, \quad pV = \frac{n}{N} RT \\ & U = \frac{U_m}{\sqrt{2}} \left( 1 - \frac{1}{\sqrt{2}} \right) \end{aligned}$$



# Things that do not belong in AL

- Anything that better fits in another language/runtime especially if:
  - It neither modifies nor accesses data in BC
  - It performs better there
  - It (already) has a HTTP API
- Complex algorithms
- Anything that's not cloud-ready (that is: doesn't work in BC SaaS)
  - .NET Interoperability
  - On-prem only stuff (you should have already started phasing that out)
- Forking Base App for on-prem purposes



# The many bad ways of Code Deprecation

10 YEAR ANNIVERSARY  
10 YEAR ANNIVERSARY

# Context: Per Tenant Extension

We need to:

- delete a field
- remove a table
- remove a function
- ..

What do we do?

Options:

- Obsolete the object and go through a default upgrade process
- Delete the code and deploy by ...


... using the “Force” ..







## Upload And Deploy Extension


### Upload Extension


Select .app file  

### Deploy Extension

Deploy to  

Language  

Schema Sync Mode  

Accept the privacy policy and t...  

Microsoft Business Central PTE Disclaimer

Privacy and Cookies

[Read more about the best practices for installing and publishing extensions](#)

# Dangers ...

- Unexpected code removals
- Unexpected data loss
- Broken dependencies
- Runtime errors
- ..



# Recommendations

- Don't use the "Force"
- Only use it in an **"isolated"** deployment:
  - After giving dependent apps enough time to be redesigned
  - **1 PullRequest** that removes all obsolete code
  - Snapshots / **backups** are in place
- NEVER automate such a step





# Overloading

```
procedure AwesomeBusinessLogic()  
begin  
    Sleep(1000)  
end;
```

# Overloading

```
#if CLEAN21
    [Obsolete('We need one with an configurable amount', 'v21')]
#endif
0 references
procedure AwesomeBusinessLogic()
begin
    // Sleep(1000)
    AwesomeBusinessLogic(1);
end;

1 reference
procedure AwesomeBusinessLogic(Seconds: Integer)
begin
    Sleep(Seconds * 1000);
end;
```



**Any Questions?**



# Comment 'n forget

So I am back at this, what did I want to do with it?

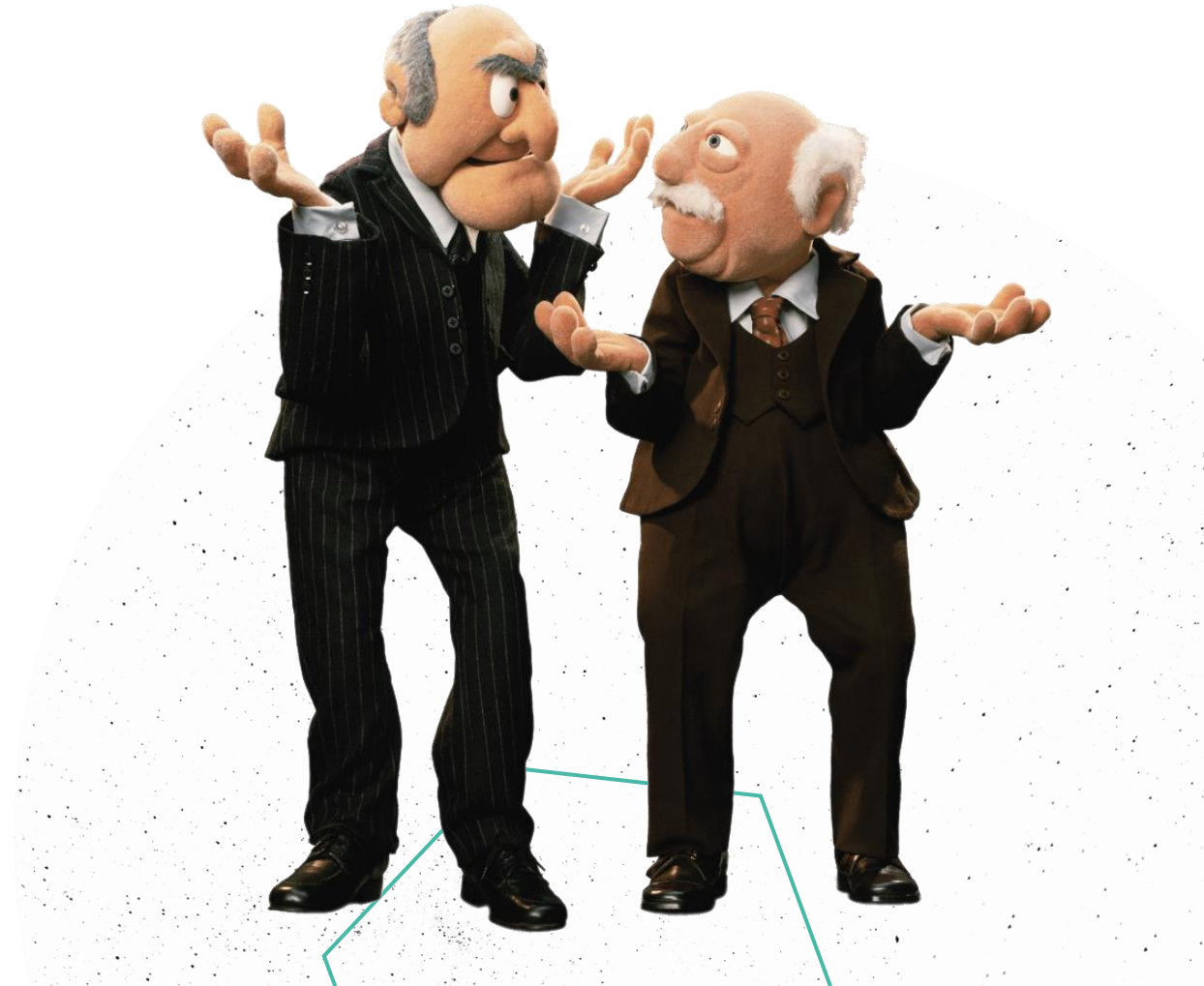
10 YEAR ANNIVERSARY  
10 YEAR ANNIVERSARY

# One day, a piece of code is bugging me...

```
1293         InsertOHValueEntry(GlobalValueEntry, OverheadAmount, OverheadAmountACY);
1294     if (Item."Costing Method" = Item."Costing Method"::Standard) and
1295         ("Entry Type" = "Entry Type"::Purchase) and
1296         (GlobalValueEntry."Entry Type" <> GlobalValueEntry."Entry Type"::Revaluation)
1297     then
1298         InsertVarValueEntry(
1299             GlobalValueEntry,
1300             -GlobalValueEntry."Cost Amount (Actual)" + OverheadAmount,
1301             -(GlobalValueEntry."Cost Amount (Actual) (ACY)" + OverheadAmountACY));
1302     end;
1303 end else begin
1304     // if IsBalanceExpectedCostFromRev(ItemInLine) then
1305     //     InsertBalanceExpCostRevEntry(GlobalValueEntry);
1306
1307     // IsHandled := false;
1308     // OnItemValuePostingOnBeforeInsertOHValueEntry(ItemInLine, GlobalValueEntry, GlobalItemLedgEntry, Val
1309     // if not IsHandled then
1310     //     if ((GlobalValueEntry."Valued Quantity" > 0) or
1311     //         ("Applies-to Entry" <> 0) and ("Entry Type" in ["Entry Type"::Purchase, "Entry Type"::Asse
1312     //         (OverheadAmount <> 0)
1313     //         then
1314     //             InsertOHValueEntry(GlobalValueEntry, OverheadAmount, OverheadAmountACY);
1315
1316     // if ((GlobalValueEntry."Valued Quantity" > 0) or ("Applies-to Entry" <> 0)) and
1317     //     ("Entry Type" = "Entry Type"::Purchase) and
1318     //     (Item."Costing Method" = Item."Costing Method"::Standard) and
1319     //     (Round(VarianceAmount, GLSetup."Amount Rounding Precision") <> 0) or
1320     //     VarianceRequired
1321     // then
1322     //     InsertVarValueEntry(GlobalValueEntry, VarianceAmount, VarianceAmountACY);
1323 end;
1324 if (GlobalValueEntry."Valued Quantity" < 0) and
1325     (GlobalItemLedgEntry.Quantity = GlobalItemLedgEntry."Invoiced Quantity")
1326 then
1327     UpdateItemApplnEntry(GlobalValueEntry."Item Ledger Entry No.", "Posting Date");
1328 end;
```

# Questions that are difficult to answer

- Why was it commented out?
  - ... causing problems?
  - ... unfinished work?
  - ... refactoring in progress?
  - ... meant to be deleted?
- Should it be
  - ...deleted?
  - ...uncommented?
  - ...refactored?
- Was it already refactored?





# What to do?

- The best: never leave commented out code for later.
- CI rejects any blocks of commented code of more than *n* lines.
- Use pragmas instead of comments.

```
1303         end else begin
1304         #if D2101_Problem_01
1305             if IsBalanceExpectedCostFromRev(ItemJnLine) then
1306                 InsertBalanceExpCostRevEntry(GlobalValueEntry);
1307
1308             IsHandled := false;
1309             OnItemValuePostingOnBeforeInsertOHValueEntry(ItemJnLine, GlobalValueEntry, GlobalItemL
1310             if not IsHandled then
1311                 if ((GlobalValueEntry."Valued Quantity" > 0) or
1312                     ("Applies-to Entry" <> 0) and ("Entry Type" in ["Entry Type"::Purchase, "Entry
1313                     (OverheadAmount <> 0)
1314                 then
1315                     InsertOHValueEntry(GlobalValueEntry, OverheadAmount, OverheadAmountACY);
1316
1317                 if ((GlobalValueEntry."Valued Quantity" > 0) or ("Applies-to Entry" <> 0)) and
1318                     ("Entry Type" = "Entry Type"::Purchase) and
1319                     (Item."Costing Method" = Item."Costing Method"::Standard) and
1320                     (Round(VarianceAmount, GLSetup."Amount Rounding Precision") <> 0) or
1321                     VarianceRequired
1322                 then
1323                     InsertVarValueEntry(GlobalValueEntry, VarianceAmount, VarianceAmountACY);
1324             #endif
1325         end;
```

Q & A (for real)

**Any Questions?**

# Stating the obvious

10 YEAR ANNIVERSARY



# God functions God codeunits

BC/NAV  
TECH  
DAYS  
2022  
10 YEAR ANNIVERSARY



[www.bctechdays.com](http://www.bctechdays.com)

# Hard coded values

## Goes into the obvious group

# Actions without Images



# Manipulate data in SQL

BC/NAV  
TECH  
DAYS  
2022  
10 YEAR ANNIVERSARY



www.bctechdays.com

# Debug messages that end up in LIVE environment

BC/NAV  
TECH  
DAYS  
2022  
10 YEAR ANNIVERSARY



www.bctechdays.com

# DEV license in TEST/QA environment

10 YEAR ANNIVERSARY



[www.bctechdays.com](http://www.bctechdays.com)



# Not minding about UsageCategory

BC/NAV  
TECH  
DAYS  
2022  
10 YEAR ANNIVERSARY



www.bctechdays.com

# Options in stead of enums

# Security Filters



# Business logic in pages

BC/NAV  
TECH  
DAYS  
2022  
10 YEAR ANNIVERSARY



www.bctechdays.com

If then else if then else if then  
else if then fucking if else what?

BC/NAV  
TECH  
DAYS  
2022  
10 YEAR ANNIVERSARY



www.bctechdays.com

# Not taking advantage of Telemetry

BC/NAV  
TECH  
DAYS  
2022  
10 YEAR ANNIVERSARY



[www.bctechdays.com](http://www.bctechdays.com)



# Global Variables

10 YEAR ANNIVERSARY