



Directions  
NORTH AMERICA



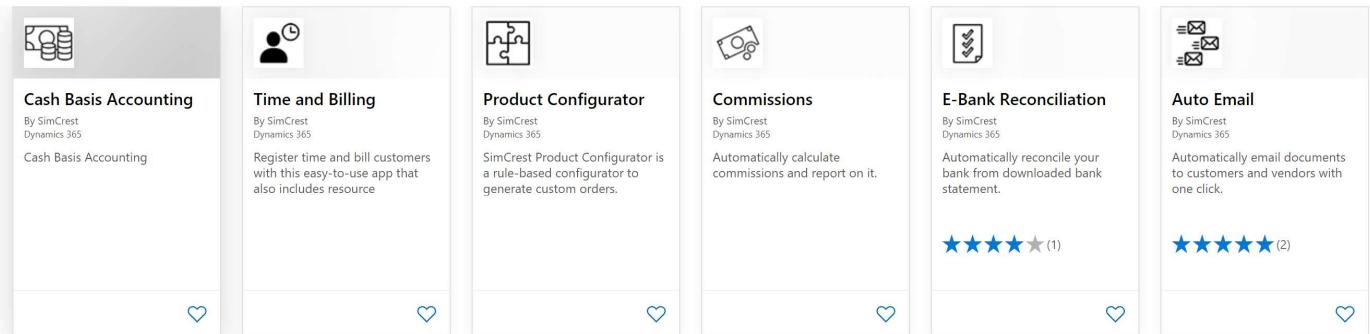
# **Business Central Migration Series 200: Migrate Dynamics NAV add-ons to BC Cloud.**

For Business Central AppSource

Carsten Howitz, SimCrest, Inc.

# Introduction – Carsten Howitz

- Started working with Navigator / Navision in 1990 in Denmark.
- Development, System Architect, Consulting, and Project Management of Navigator, Navision, Navision Financials, Dynamics NAV, and Business Central.
- Founded SimCrest, Inc. in 2001. Dallas, Miami, Los Angeles.
- Converted several customers from NAV to BC.
- Developed Six Apps currently on Business Central AppSource.



# Agenda

- Using prefixes and making the best of it. Pitfalls when naming objects.
- Creating delta files from the old add-ons.
- Using Txt2AL tool to convert delta files to AL and fixing issues with code.
- Code compliance: permission sets, data classification, table and field names, upgrade and install code.
- How to use TempBlob for file management.
- Docker or Sandbox development?
- Standard use of Dates and Booleans.
- What about .Net variables? What to use instead.
- Making your own Apps extendable.
- Test apps. What do you need to cover?
- Monetization options.

# Migration Checklist

1. Getting Object Range and Prefix
2. Convert Objects from C/AL to AL to create Extension
3. Create Test App

Full Microsoft Technical Validation Check List

<https://docs.microsoft.com/en-us/dynamics365/business-central/dev-itpro/developer/devenv-checklist-submission>

# Prefix and App Prefix

- Apply for Prefix
- Mandatory in Apps for
  - New Tables (name only)
  - New Pages (name only)
  - Table Extensions (name and fields)
  - Page Extensions (name and fields)
  - Enum Extensions
- Use App Prefix / Suffix
- Unique within company
- Avoid issues down the road

```
Tab-Ext70163481.SIMCCSHGLEntryExt.al x
0 references
1 tableextension 70163481 "SIMC CSH G/L Entry Ext" extends "G/L Entry"
2 {
3     fields
4     {
5         6 references
6             field(70163480; "SIMC CSH Tax Entry"; Boolean)
7             {
8                 Caption = 'Tax Entry';
9                 DataClassification = CustomerContent;
10            }
11            5 references
12                field(70163481; "SIMC CSH Exclude In Cash"; Boolean)
13                {
14                    Caption = 'Exclude In Cash';
15                    DataClassification = CustomerContent;
16                }
17                keys
18                {
19                    - reference
20                        Key(SIMCCSHKey1; "SIMC CSH Exclude In Cash", "SIMC CSH Tax Entry")
21                        {
22                            }
23                }
24            }
25 }
```

# Object Range

- Do not use whole range
- Specify per App
- Avoid overlaps

```
  "id": "52c9c623-8198-4aeb-87ea-95ca9458dd80",
  "name": "Cash Basis Accounting",
  "publisher": "SimCrest",
  "brief": "SimCrest Cash Basis allows you to calculate your General Ledger using both Accrual (earned) and cash basis accounting. The Cash Basis focus is, as its name implies, on the flow of cash. Whenever cash is collected or paid out, it is recorded in the General Ledger immediately. This makes it easier to track cash flow and prepare financial statements. The Accrual basis focuses on the earning and spending of revenue and expenses over time, regardless of when cash is actually received or paid out. This can result in a different picture of financial performance than cash basis accounting, especially for companies with significant receivables or payables. Both methods have their pros and cons, and the choice between them depends on the specific needs of the organization and its industry.",  
  "description": "The Cash Basis focus is, as its name implies, on the flow of cash. Whenever cash is collected or paid out, it is recorded in the General Ledger immediately. This makes it easier to track cash flow and prepare financial statements. The Accrual basis focuses on the earning and spending of revenue and expenses over time, regardless of when cash is actually received or paid out. This can result in a different picture of financial performance than cash basis accounting, especially for companies with significant receivables or payables. Both methods have their pros and cons, and the choice between them depends on the specific needs of the organization and its industry.",  
  "version": "1.0.3.0",  
  "lastUpdated": "2023-01-15T14:00:00Z",  
  "support": "You, 5 months ago • Support for US and CA",  
  "privacyStatement": "http://simcrest.com/BC/CashBasis/PrivacyPolicyCashBasis.html",  
  "EULA": "http://simcrest.com/BC/CashBasis/SoftwareLicenseAgreementCashBasis.pdf",  
  "help": "http://simcrest.com/Products/cashbasis",  
  "url": "http://simcrest.com",  
  "logo": "BC/CashBasisLogo216.png",  
  "capabilities": [],  
  "dependencies": [],  
  "screenshots": ["bc/screenshot_2.png", "bc/screenshot_1.png", "bc/screenshot_3.png", "bc/screenshot_4.png"],  
  "platform": "13.0.0.0",  
  "application": "13.0.0.0",  
  "runtime": "2.0",  
  "idRange": {  
    "from": 70163480,  
    "to": 70163499  
  },  
  "features": [  
    "TranslationFile"  
  ]  
}
```

## **Check List: Object conversion from C/AL to AL**

1. Export all objects from modified database into text file (modified.txt)
2. Export all objects from standard database into text file (original.txt)
3. Run script to split objects into separate files and compare  
Result: Delta files
4. Run txt2al tool to convert to AL files
5. Create new AL project in VS Code
6. Copy new AL files into VS Code project
7. Start fixing issues !!

# Delta Files

- Files containing the difference (delta) between the modified objects and the original objects

Modified						Original						Delta					
E...	Field No.	Field Name	Data Type	Length	Description	E...	Field No.	Field Name	Data Type	Length	Description	E...	Field No.	Field Name	Data Type	Length	Description
✓	5810 Return Qty. Received (Base)		Decimal			✓	5810 Return Qty. Received (Base)		Decimal			✓	87750 Commission Rate	Decimal		SC.COM1.22	
✓	5811 Appl.-from Item Entry		Integer			✓	5811 Appl.-from Item Entry		Integer			✓	87752 Com Rate Override	Boolean		SC.COM1.22	
✓	5909 BOM Item No.		Code	20		✓	5909 BOM Item No.		Code	20							
✓	6600 Return Receipt No.		Code	20		✓	6600 Return Receipt No.		Code	20							
✓	6601 Return Receipt Line No.		Integer			✓	6601 Return Receipt Line No.		Integer								
✓	6608 Return Reason Code		Code	10		✓	6608 Return Reason Code		Code	10							
✓	7001 Allow Line Disc.		Boolean			✓	7001 Allow Line Disc.		Boolean								
✓	7002 Customer Disc. Group		Code	20		✓	7002 Customer Disc. Group		Code	20							
✓	10000 Package Tracking No.		Text	30		✓	10000 Package Tracking No.		Text	30							
✓	87750 Commission Rate		Decimal		SC.COM1.22												
✓	87752 Com Rate Override		Boolean		SC.COM1.22												

- We need the following objects in txt format:
  - Modified.txt, all objects from the database with the modifications
  - Original.txt, all objects from the database with no modifications
  - Must be the same NAV / BC version and CU

# Delta File – Example Table 37

```
OBJECT Modification "Sales Line"(Table 37)
{
    OBJECT-PROPERTIES
    {
        Date=06/01/18;
        Time=10:46:53 AM;
        Modified=Yes;
        Version List=NAVW110.00,NAVNA10.00,SC.COM1.22;
    }
    PROPERTIES
    {
        Target="Sales Line"(Table 37);
    }
    CHANGES
    {
        { Insertion      ;InsertAfter="Package Tracking No."(Field 10000);
          ChangedElements=FieldCollection
          {
              { 87750;  ;Commission Rate      ;Decimal      ;OnValidate=BEGIN
                  TestStatusOpen;
                  TESTFIELD("Quantity Invoiced",0);
                  IF ("Commission Rate" <> xRec."Commission Rate") THEN
                      "Com Rate Override":= TRUE;
                  END;

                  Description=SC.COM1.22 }
              ;OnValidate=BEGIN
                  TestStatusOpen;
                  TESTFIELD("Quantity Invoiced",0);
                  END;

                  Description=SC.COM1.22 }

          }
    }
}
```

# Convert to Delta files - Script

> This PC > Local Disk (C:) > AL >			
	Name	Date modified	Type
1	original.txt	3/28/2019 12:54 PM	Text Document
2	modified.txt	3/28/2019 11:30 AM	Text Document
3	AL	3/28/2019 2:46 PM	File folder
4	DELTA	3/28/2019 2:44 PM	File folder
5	MOD	3/28/2019 1:55 PM	File folder
6	ORG	3/28/2019 1:55 PM	File folder

```
Split and Compare to BC.ps1
1 # You may have to load this if running first time
2 # Set-ExecutionPolicy -ExecutionPolicy RemoteSigned
3
4 # Load Prerequisites
5 Import-Module 'C:\Program Files (x86)\Microsoft Dynamics 365 Business Central\130\RoleTailored Client\NavModelTools.ps1'
6
7 # Export objects from base line
8 # Place original.txt as all baseline objects that are modified in MOD file
9 # Place modified.txt as baseline plus all modified objects that needs to be in extension
10 Split-NAVApplicationObjectFile -Source c:\al\original.txt -Destination 'c:\al\ORG' -Force
11 Split-NAVApplicationObjectFile -Source c:\al\modified.txt -Destination 'c:\al\MOD' -Force
12
13 # Compare
14 Compare-NAVApplicationObject -OriginalPath c:\al\ORG -ModifiedPath c:\al\MOD -DeltaPath c:\al\DELTA -Force -ExportToNewSyntax
15
16 # Create AL files
17 cd 'c:\Program Files (x86)\Microsoft Dynamics 365 Business Central\130\RoleTailored client'
18 .\txt2al.exe --source=c:\al\delta --target=c:\al\al|
```

Script is available on <https://github.com/SimCrestInc/DirectionsLasVegas2019>

# **Fixing Issues in new AL project – VS Code**

- Activate source code tracking (Git)
- .gitignore file (ignore \*.app files, launch.json, etc.)
- Update app.json
- Copy and paste AL files into project
- Create settings.json
  - Auto Rename and Auto Prefix
- Create folders for related objects
- Fix tables first

# **Demo – Convert to AL and fix**

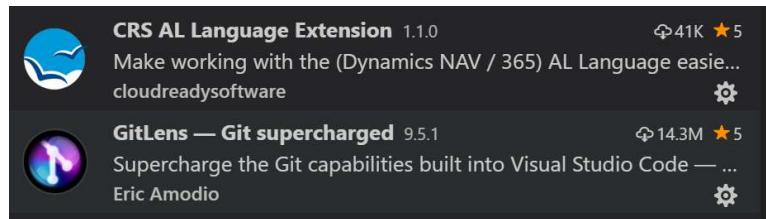


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# Fixing issues – Time savers

- Install CRS AL Language
- Install Git Lens
- Settings.json prefix / rename
- Ctrl-Space makes suggestions



```
"CRS.ObjectNamePrefix": "SIMC ",  
"CRS.OnSaveAlFileAction": "Rename"
```

# Fix Codeunits

- All modifications in codeunits must be reviewed and coded as subscribers in the extension (or reimplemented)
- Check Delta Files for Codeunits

Example:

- Sales order pricing
  - Based on Shipment Date (not order or invoice date)
  - Should depend on Check Mark in Sales & Receivable Setup

# CU 7000: Sales Price Calc. Mgt.

```

CASE Type OF
  Type::Item:
    BEGIN
      Item.GET("No.");
      SalesLinePriceExists(SalesHeader, SalesLine, FALSE); ←
      CalcBestUnitPrice(TempSalesPrice);
      IF FoundSalesPrice OR
        NOT ((CalledByFieldNo = FIELDNO(Quantity)) OR
          (CalledByFieldNo = FIELDNO("Variant Code")))
      THEN BEGIN
        "Allow Line Disc." := TempSalesPrice."Allow Line Disc.";
        "Allow Invoice Disc." := TempSalesPrice."Allow Invoice Disc.";
        "Unit Price" := TempSalesPrice."Unit Price";
      END;
      IF NOT "Allow Line Disc." THEN
        "Line Discount %" := 0;
    END;

```

```

608 [External] SalesLinePriceExists(SalesHeader : Record "Sales Header";VAR SalesLine : Record "Sales Line";ShowAll : Boolean) : Boolean
609   WITH SalesLine DO
610     IF (Type = Type::Item) AND Item.GET("No.") THEN BEGIN
611       IsHandled := FALSE;
612       OnBeforeSalesLinePriceExists(
613         SalesLine, SalesHeader, TempSalesPrice, Currency, CurrencyFactor,
614         SalesHeaderStartDate(SalesHeader, DateCaption), Qty, QtyPerUOM, ShowAll, IsHandled);
615       IF NOT IsHandled THEN BEGIN
616         FindSalesPrice(
617           TempSalesPrice, GetCustNoForSalesHeader(SalesHeader), SalesHeader."Bill-to Contact No.",
618           "Customer Price Group", ',', "No.", "Variant Code", "Unit of Measure Code",
619           SalesHeader."Currency Code", SalesHeaderStartDate(SalesHeader, DateCaption), ShowAll);
620         OnAfterSalesLinePriceExists(SalesLine, SalesHeader, TempSalesPrice, ShowAll);
621       END;
622       EXIT(TempSalesPrice.FINDFIRST);
623     END;
624   EXIT(FALSE);

```

```

L LOCAL SalesHeaderStartDate(SalesHeader : Record "Sales Header";VAR DateCaption : Text[30]) : Date
  WITH SalesHeader DO
    IF "Document Type" IN ["Document Type":Invoice,"Document Type":Credit Memo] THEN BEGIN
      DateCaption := FIELDCAPTION("Posting Date");
      EXIT("Posting Date")
    END ELSE BEGIN
      DateCaption := FIELDCAPTION("Order Date");
      EXIT("Order Date");
    END;

```

Event Requests: <https://github.com/microsoft/al/issues>

# Extension Solution

```
[EventSubscriber(ObjectType::Codeunit, Codeunit::"Sales Price Calc. Mgt.", 'OnBeforeSalesLinePriceExists', '', true, true)] You,
0 references
local procedure BeforeSalesLinePriceIsCalculate(VAR SalesLine: Record "Sales Line"; VAR SalesHeader: Record "Sales Header";
                                                VAR TempSalesPrice: Record "Sales Price"; var InHandled: Boolean; ShowAll: Boolean)
var
    SalesPriceCalcMgmt: Codeunit "Sales Price Calc. Mgt.";
    SalesReceivableSetup: Record "Sales & Receivables Setup";
begin
    SalesReceivableSetup.Get();
    if not SalesReceivableSetup."Calculate Price From Shipment Date" then
        exit;

    // Use Shipment Date
    with SalesLine do begin
        SalesPriceCalcMgmt.FindSalesPrice(TempSalesPrice, SalesHeader."Sell-to Customer No.", SalesHeader."Bill-to Contact No.",
                                            "Customer Price Group", '', "No.", "Variant Code", "Unit of Measure Code",
                                            SalesHeader."Currency Code", "Shipment Date", ShowAll);
    end;
    InHandled := true;
end;

[External] SalesLinePriceExists(SalesHeader : Record "Sales Header";VAR SalesLine : Record "Sales Line";ShowAll : Boolean) : Boolean
609 WITH SalesLine DO
610     IF (Type = Type:::Item) AND Item.GET("No.") THEN BEGIN
611         IsHandled := FALSE;
612         OnBeforeSalesLinePriceExists(
613             SalesLine,SalesHeader,TempSalesPrice,Currency,CurrencyFactor,
614             SalesHeaderStartDate(SalesHeader,DateCaption),Qty,QtyPerUOM,ShowAll,IsHandled);
615         IF NOT IsHandled THEN BEGIN
616             FindSalesPrice(
617                 TempSalesPrice,GetCustNoForSalesHeader(SalesHeader),SalesHeader."Bill-to Contact No.",
618                 "Customer Price Group", '', "No.", "Variant Code", "Unit of Measure Code",
619                 SalesHeader."Currency Code",SalesHeaderStartDate(SalesHeader,DateCaption),ShowAll);
620             OnAfterSalesLinePriceExists(SalesLine,SalesHeader,TempSalesPrice,ShowAll);
621         END;
622         EXIT(TempSalesPrice.FINDFIRST);
623     END;
624     EXIT(FALSE);

```

# Install Code

- Runs every time the extension is installed

```
codeunit 70163504 "SIMC CNF Install"
{
    Subtype = Install;

    var
        1 reference
        CNFSetup: Record "SIMC CNF Configurator Setup";

    trigger OnInstallAppPerCompany()
    begin
        CNFSetup.CreateStandardSetup();      You, a minu
    end;

    trigger OnInstallAppPerDatabase()
    begin
    end;
}
```

4 references

```
procedure CreateStandardSetup()      You, 6 months ago • cah
var
    NoSeries: Record "No. Series";
    NoSeriesLine: Record "No. Series Line";
    CNFSub: Codeunit "SIMC CNF Subscription";
begin
    If not Get then begin
        "Primary Key" := '';
        "Expiration Date" := CalcDate('30D', Today());
        "Trial Period" := true;
        "Activation Code" := CNFSub.CreateTrialActivationCode("Expiration Date");
    with NoSeries do begin
        Code := 'SIMC-CFITM';
        Description := 'Configurator Item-Bom No.';
        "Default Nos." := true;
        // Insert if possible
        if insert then;
    end;
    with NoSeriesLine do begin
        "Series Code" := NoSeries.Code;
```

# Upgrade Code

- Runs every time the extension is upgraded

```
codeunit 70163505 "SIMC CNF Upgrade"
{
    Subtype = Upgrade;

    var
        1 reference
        CNFSetup: Record "SIMC CNF Configurator Setup";

    trigger OnUpgradePerCompany()
    begin
        CNFSetup.CreateStandardSetup();
    end;

    trigger OnUpgradePerDatabase()
    begin
    end;
}
```

You, 4 months ago • Updated install and update

```
procedure CreateStandardSetup()          You, 6 months ago • cah
var
    NoSeries: Record "No. Series";
    NoSeriesLine: Record "No. Series Line";
    CNFSub: Codeunit "SIMC CNF Subscription";
begin
    If not Get then begin
        "Primary Key" := '';
        "Expiration Date" := CalcDate('30D', Today());
        "Trial Period" := true;
        "Activation Code" := CNFSub.CreateTrialActivationCode("Expiration Date");
        with NoSeries do begin
            Code := 'SIMC-CFITM';
            Description := 'Configurator Item-Bom No.';
            "Default Nos." := true;
            // Insert if possible
            if insert then;
        end;
        with NoSeriesLine do begin
            "Series Code" := NoSeries.Code;
        end;
    end;
}
```

# Permissions Sets

- Permissions related to the extension should be maintained in the extension itself:

The diagram illustrates the maintenance of permissions for an extension. On the left, a screenshot of a code editor shows XML configuration for a permission set named "SIMC PROD CONFIG". The XML defines three permission sets, each associated with a specific role ID and extension name ("SimCrest Product Configurator"). On the right, a screenshot of a user interface titled "PERMISSION SET LOOKUP" displays a table of permission sets. The table includes columns for Role ID, Name, Extension Name, and Scope. The row for the "SIMC PROD CONFIG" permission set is highlighted with a red border, indicating it is the one being managed. The "Extension Name" column lists "Product Configurator" for this row, matching the XML configuration.

ROLE ID	NAME	EXTENSION NAME	SCOPE
SIMC PROD CONF SE...	SimCrest Product Configurator	Product Configurator	Tenant
SIMC PROD CONFIG	SimCrest Product Configurator	Product Configurator	Tenant
SIMC AUTOEMAIL SE...	SimCrest Auto Email Setup	Auto Email	Tenant
SIMCREST AUTOEMAIL	SimCrest Auto Email	Auto Email	Tenant

# Profiles and Role Centers in Extensions

The diagram illustrates the connection between a PowerApp XML code snippet and a Dynamics 365 extension profile.

**PowerApp XML Code Snippet:**

```
0 references | You, 3 months ago | 2 authors (simcrest and others)
profile "CONSULTANT"
{
    Description = 'SimCrest Consultant';
    RoleCenter = "Consultant Role Center";
}
1 reference
page 52000 "Consultant Role Center"
{
    PageType = RoleCenter;

    layout
    {
        0 references
        area(rolecenter)
        {
            0 references
            group(Group1)
            {
                0 references
                part(JobAct; "SimCrest Job Activities")
                {
                    ApplicationArea = All;
                }
            }
            0 references
            group(Group2)
            {

```

**Dynamics 365 Extension Profile:**

PROFILE ID	DESCRIPTION	SCOPE	EXTENSION NAME	ROLE CENTER ID	DE...	ROLE...	DIS...
CONSULTANT	SimCrest Consultant	Tenant	SimCrest Production	52000	<input type="checkbox"/>	<input type="checkbox"/>	

# .Net in BC Cloud

Available APIs:

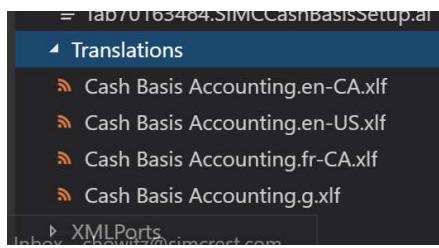
- HTTP
- JSON
- TextBuilder
- XML

Class	Description
HttpClient	Provides a base class for sending HTTP requests and receiving HTTP responses from a resource identified by a Uniform Resource Identifier (URI).
HttpContent	A base class representing an HTTP entity body and content headers.
HttpHeaders	The HttpHeaders class contains a collection of headers and their values.
HttpRequestMessage	Represents an HTTP request message.
HttpReponseMessage	Represents an HTTP response message.
JsonArray	JsonArray is a container for any well-formed JSON array. A default JsonArray contains an empty JSON array.
JsonObject	JsonObject object is a container for any well-formed JSON object. A default JsonObject contains an empty JSON object.
JsonToken	JsonToken object is a container for any well-formed JSON data. A default JsonToken contains the JSON value of NULL.
JsonValue	JsonValue object is a container for any well-formed JSON object. A default JsonValue is set to the JSON value of NULL.
TextBuilder	TextBuilder can performantly concatenate multiple bigger strings together.
XmlAttribute	Represents an attribute.
XmlAttributeCollection	Represents a collection of attributes associated with an XmlElement.
XmlCData	Represents the CDATA section.
XmlComment	Represents the content of an XML comment.
XmlDeclaration	Represents the XML declaration node.
XmlDocument	Represents an XML document. This class can be used to load, validate, edit, add, and position XML in a document.
XmlDocumentType	Represents the document type declaration.
XmlElement	Represents an element.
XmlNamespaceManager	Resolves, adds, and removes namespaces to a collection and provides scope management for these namespaces.
XmlNameTable	Table of automized string object.
XmlNode	Represents a single node in the XML document.
XmlNodeList	Represents an ordered collection of nodes.
XmlProcessingInstruction	Represents a processing instruction, which XML defines to keep processor-specific information in the text of the document.
XmlText	Represents the text content of an element or attribute.

t & Spa, Las Vegas, NV

# Translation Files

- Check requirements for each country
- Use MS Multilingual Editor with Translator Text (Azure)

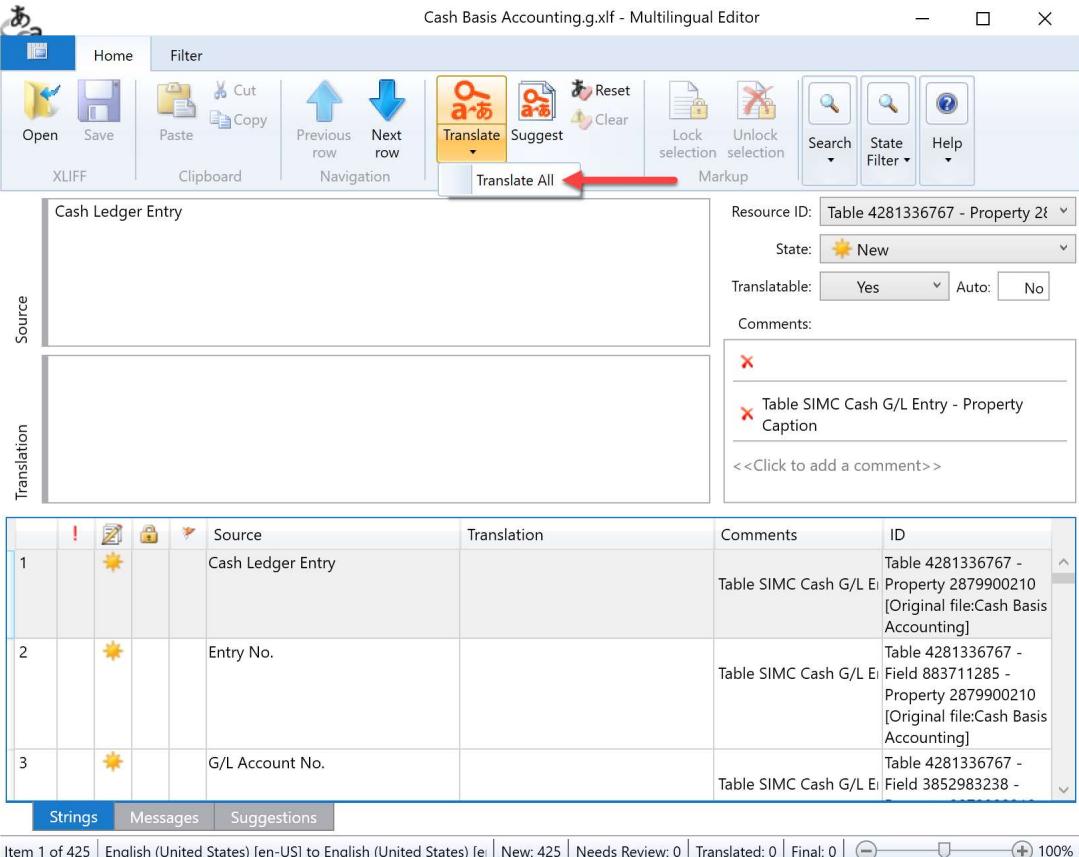


Country/Region	Language Code
Australia	en-AU
Austria	de-AT
Belgium	nl-BE fr-BE
Canada	en-CA fr-CA
Czechia (on-premises only)	cs-CZ
Denmark	da-DK
Germany	de-DE
Finland	fi-FI
France	fr-FR

<https://docs.microsoft.com/en-us/dynamics365/business-central/dev-itpro/compliance/apptest-countries-and-translations>

# Multilingual Editor

- Use Translator Text (Azure)



The screenshot shows the Multilingual Editor interface for a file named "Cash Basis Accounting.g.xlsx". The main window has two main sections: "Source" and "Translation". The Source section contains the text "Cash Ledger Entry". The Translation section is currently empty. On the ribbon bar, the "Home" tab is selected. In the ribbon toolbar, there is a "Translate" icon with a dropdown arrow, which is highlighted with a red arrow. Other icons include Open, Save, Paste, Copy, Previous row, Next row, Suggest, Reset, Clear, Lock selection, Unlock selection, and Markup. To the right of the ribbon, there are several status fields: Resource ID: Table 4281336767 - Property 2; State: New; Translatable: Yes; Auto: No; and Comments: "Table SIMC Cash G/L Entry - Property Caption". Below the ribbon, a table lists three entries with columns for ID, Comments, and Source/Translation. At the bottom of the interface, there are tabs for "Strings", "Messages", and "Suggestions", along with a progress bar indicating Item 1 of 425, English (United States) [en-US] to English (United States) [en], New: 425, Needs Review: 0, Translated: 0, Final: 0, and a zoom level of 100%.

ID	Comments
Table 4281336767 - Property 2879900210 [Original file:Cash Basis Accounting]	Table SIMC Cash G/L Entry - Property Caption
Table 4281336767 - Field 883711285 - Property 2879900210 [Original file:Cash Basis Accounting]	Table SIMC Cash G/L Entry - Property Caption
Table 4281336767 - Field 3852983238 -	Table SIMC Cash G/L Entry - Property Caption

# Translator API (Azure)

Dashboard > New > Translator Text

## Translator Text

Microsoft



**Translator Text**  
Microsoft

[Create](#) [Save for later](#)

Microsoft Translator API is an ISO and HIPAA compliant neural machine translation (NMT) service that developers can easily integrate into their applications, websites, tools, or any solution requiring multi-language support such as company websites, e-commerce sites, customer support applications, messaging applications, internal communication, and more.

**Extend the reach of your applications**

Translate text to and from 60+ supported languages through the open REST interface of Translator API.

**Transliterate into different alphabets**

Display text in different alphabets to make it easier to read - translate from Chinese characters to PinYin, display any of the supported [transliteration languages](#) in the Latin alphabet, and even show words written in the Latin alphabet in non-Latin characters such as Arabic, Hindi or Japanese.

**Quota info**

Free tier include quantity Total  
**2000000 Characters**

Free tier include quantity Remaining  
**1988178 Characters**

# Testing and Debugging (F5)

- Use Docker
  - Easy change of Country version. A must for Apps supporting multiple countries
  - Test against future versions
- Use Cloud Sandbox
  - Probably fastest and most accessible
  - Easy access from anywhere

# Making your own App extendable

- You should create events in your own apps to make them extendable
- Find key parts of Apps you can allow partners to extend
- Allow partners to suggest events in your Apps
- Ideally your first release should have key events
- Write documentation for events and post example on Github
- See example for Auto Email App.

# Auto Email Example

- Email Sales documents like quotes, orders, invoices, cr. memos, statements etc. PO's also supported.
- Emails are logged to a log table and processed.
- What can be extended?
  - Pretty much anything with a unique document no. or record number (production order, fixed asset etc. etc.)



# Auto Email: Document Type (Enum)

- Enums are extendable and works like Options

```
enum 70163325 "SIMC AEM Document Type"
{
    Extensible = true;
    value(0; SalesQuote) { Caption = 'Sales Quote'; }
    value(1; SalesOrder) { Caption = 'Sales Order'; }
    value(2; SalesReturnOrder) { Caption = 'Sales Return Order'; }
    value(3; SalesInvoice) { Caption = 'Sales Invoice'; }
    value(4; SalesCreditMemo) { Caption = 'Sales Credit Memo'; }
    value(5; ServiceInvoice) { Caption = 'Service Invoice'; }
    value(6; ServiceCrMemo) { Caption = 'Service Cr. Memo'; }
    value(7; PurchaseOrder) { Caption = 'Purchase Order'; }
    value(8; Statement) { Caption = 'Statement'; }
    value(9; Shortpaid) { Caption = 'Shortpaid'; }
    value(10; Collection) { Caption = 'Collection'; } You, 4 m
}
```

```
1 enumextension 50100 "DocTypeExt" extends "SIMC AEM Document Type"
2 {
3     value(50000; Deposit)
4     {
5         Caption = 'Deposit';
6     }
7 }
```

# Before Logging Email Event

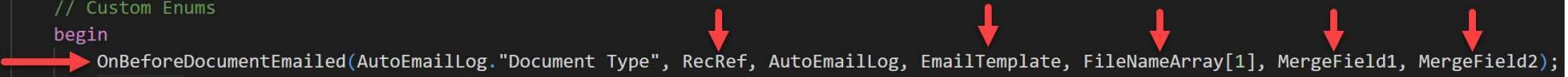
```
DocType::Collection:  
  BEGIN  
    Cust.GET(DocNo);  
    SetupEmails(0, DocNo, Emailto, ccEmailTo, bccEmailTo, TriggerError);  
    IF TriggerError THEN  
      AutoEmailLog."Error Code" := 'Not set up to receive collections by email';  
      EmailTemplate.Get(AutoEmailSetup."Collection Template");  
      AutoEmailLog.Subject := StrSubstNo(EmailTemplate."Email Subject", Cust.Name);  
      TriggerError := Cust.CalcOverdueBalance = 0;  
      IF TriggerError AND ShowResult THEN  
        ERROR('Customer has no overdue balance');  
      IF TriggerError AND NOT ShowResult THEN  
        AutoEmailLog."Error Code" := 'Customer has no overdue balance';  
    END;  
    else  
      // All extended document types are handled here.  
      → OnBeforeLogSpecialDocType(DocType, DocNo, Emailto, ccEmailTo, bccEmailTo, TriggerError, EmailTemplate, AutoEmailLog);  
  END;  
  
  AutoEmailLog."Entry No." := NextEntryNo;  
  AutoEmailLog."Document Type" := DocType;  
  AutoEmailLog."Document No." := DocNo;  
  AutoEmailLog."Email Template" := EmailTemplate.Code;
```

# Before Document is Emailed Event

- Make sure RecRef, Email Template, Filename, and merge fields are set

```
        FileIndex += 1;
        UNTIL CustLedgerEntry.NEXT = 0;
        MergeField1 := Customer."No.";
        MergeField2 := Customer.Name;
    END;
else
    // Custom Enums
begin
    → OnBeforeDocumentEmailed(AutoEmailLog."Document Type", RecRef, AutoEmailLog, EmailTemplate, FileNameArray[1], MergeField1, MergeField2);
    TempBlob.Blob.CreateOutStream(Attachment);
    Report.SaveAs(EmailTemplate."Report No.", '', ReportFormat::Pdf, Attachment, RecRef);
    TempBlob.Blob.CreateInStream(AttachmentArray[1]);
end;
END;

// Start load AEM attachments
AutoEmailAttachmentRec.SetRange("Email Type", AutoEmailLog."Document Type");
AutoEmailAttachmentRec.SetRange(Active, true);
IF AutoEmailAttachmentRec.FindSet() then
```



# Suggestions

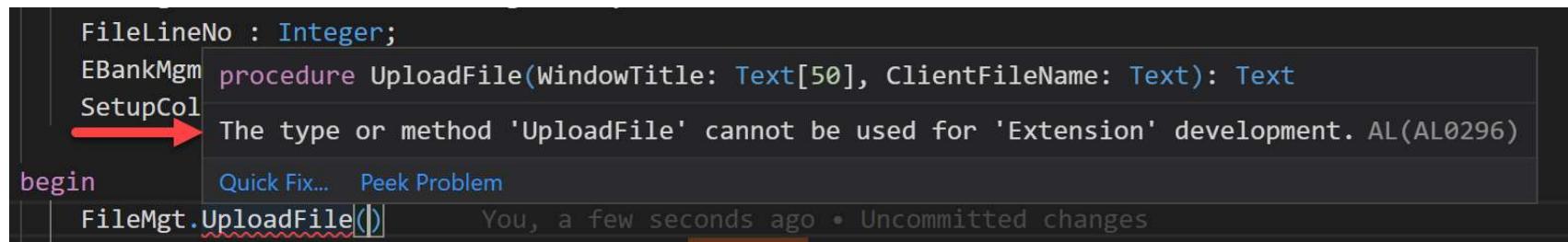
- Create a developer's manual listing all events available and how to use them.
- Post public example project on Github

The screenshot shows a GitHub repository page. At the top, it displays the repository name "SimCrestInc / AutoEmailExtended" and metrics for "Watch" (1), "Star" (0), and "Fork" (0). Below this is a navigation bar with links for "Code", "Issues 0", "Pull requests 0", "Projects 0", and "Insights". A dropdown menu for "Branch: master" is open. The main content area shows a list of files and their details. The first file listed is "Using Enums", committed by "simcrest" on December 13, 2018. Below it are two more files: "Cod50100.EventSubscribers.al" and "Enum-Ext50100.DocTypeExt.al", both committed 4 months ago.

File	Commit Details
Using Enums	simcrest on Dec 13, 2018
..	
Cod50100.EventSubscribers.al	Using Enums on 4 months ago
Enum-Ext50100.DocTypeExt.al	Using Enums on 4 months ago

# File Management in the Cloud

- Sending files to and from the Service Tier is not allowed in the Cloud



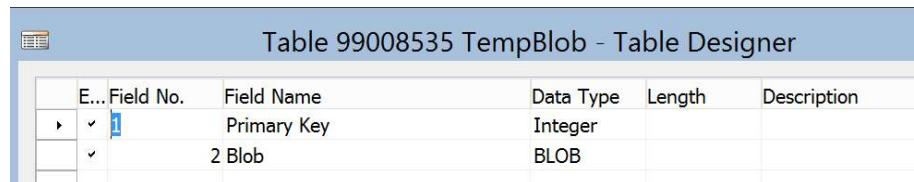
A screenshot of a Delphi IDE showing a tooltip for a procedure. The code snippet is:

```
FileLineNo : Integer;
EBankMgm
procedure UploadFile(WindowTitle: Text[50], ClientFileName: Text): Text
SetupCol
begin
  Quick Fix... Peek Problem
  FileMgt.UploadFile()

```

The tooltip message is: "The type or method 'UploadFile' cannot be used for 'Extension' development. AL(AL0296)". A red arrow points to the end of the word "UploadFile".

- So what can we use instead? TempBlob:



A screenshot of the Table Designer for the "Table 99008535 TempBlob". The table has two fields:

E...	Field No.	Field Name	Data Type	Length	Description
>	1	Primary Key	Integer		
>	2	Blob	BLOB		

# TempBlob Example

```
1 reference
procedure Import(BankAccRecon: Record "SIMC E-Bank Reconciliation")
var
    EbakSetup : Record "SIMC E-Bank Bank Setup";
    LineString: Text;
    NextLineNo: Integer;
    FileName: Text;
    ImportBankStmtTxt: Label 'Select a file to import';
    FileFilterTxt: Label 'Text Files(*.txt;*.csv)|*.txt;*.csv';
    FileFilterExtensionTxt: Label 'txt,csv';
    TempBlob: Record TempBlob; ←
    IStream: InStream;
    FileMgt: Codeunit "File Management"; ←
    FileLineNo : Integer;
    EBankMgmt : Codeunit "SIMC E-Bank Management";
    SetupColumn : array [8] of Option "None", "Date", "Document No.", Description, Amount, Debit, Credit;

begin
    ↓
    FileName:= FileMgt.BLOBImportWithFilter(TempBlob, ImportBankStmtTxt, '', FileFilterTxt, FileFilterExtensionTxt);
    If FileName=' ' then
        exit;
    EbakSetup.GET(BankAccRecon."Bank Account No.");
    NextLineNo:= 10000;
    FileLineNo:= 1;
    LoadSetupColumns(BankAccRecon."Bank Account No.", SetupColumn);
    EBankMgmt.DeleteEBankRecsForBank(BankAccRecon);
    TempBlob.Blob.CreateInStream(IStream); ←
    while IStream.ReadText(LineString)>0 do begin ←
        IF FileLineNo>EbakSetup."Ignore first X lines" THEN begin
            ImportCSV(LineString, BankAccRecon, NextLineNo, FileLineNo, SetupColumn);
            NextLineNo+= 10000;
        end;
        FileLineNo+= 1;
    end;
end;
```

# New Date format in AL

- Converted Code:

```
0 references
local procedure DateTest()
var
    PostingDate: Date;
begin
    PostingDate:= 123119D;
end;
```

Constant value '123119D' is outside the range for a Date AL(AL0191)

Quick Fix... Peek Problem

- New Format:

```
0 references
local procedure DateTest()
var
    PostingDate: Date;

begin
    PostingDate:= 20191231D; // YYYYMMDD
end;
```

# New Booleans in Reports / XML Ports

- Now consistent use of true / false (instead of Yes / No):

```
report 50040 "Consultant Sales Statistics"
{
    DefaultLayout = RDLC;
    RDLCLayout = './Reports/Consultant Sales Statistics.rdl';
    UsageCategory = ReportsAndAnalysis;
    ApplicationArea = All;

    dataset
    {
        6 references
        dataitem("Job Ledger Entry";"Job Ledger Entry")
        {
            DataItemTableView = SORTING("No.", "Posting Date", "Entry Type", Type)
                → WHERE(Chargeable=CONST([Yes]));
                You, a few seconds
            RequestFilterFields = "Posting Date", "No.";
            column(FORMAT_TODAY_0_4_;FORMAT(TODAY,0,4))
        }
    }
}
```

```
= SORTING("No.", "Posting Date", "Entry Type", Type)
→ WHERE(Chargeable=CONST([true]));
ds = "Posting Date", "No.";
```

# Test Apps

- You must submit a Test App with your Add-on App
- Must cover “80% of the code”
- They are a BIG hassle 😞 but
  - Test Apps are excellent for internal testing
  - Recurring and tedious testing can be done consistently and with ease once test scripts are developed

# Test Initialization

```
17 references
local procedure Initialize();
var
    AEL: Record "SIMC Auto Email Log";
    Customer: Record Customer;
    AutoEmailSetup: Record "SIMC Auto Email Setup";

begin
    AutoEmailSetup.CreateStandardSetup(false);
    AutoEmailSetup.Get();
    AutoEmailSetup."Trial Period" := true;
    AutoEmailSetup."Expiration Date" := today + 30;
    AutoEmailSetup."Do not send emails for testing" := true;
    AutoEmailSetup.Modify();

    AEL.DeleteAll;

    Customer.get('10000');
    Customer."SIMC Email Documents" := true;
    Customer."SIMC Email To" := 'johndoe1@contoso.com';
    Customer.Modify();
    Customer.get('20000');
    Customer."SIMC Email Documents" := true;
    Customer."SIMC Email To" := 'johndoe2@contoso.com';
    Customer.Modify();

end;
```

# Test Example 1

```
[Test]
0 references
procedure TestSalesOrderEmailed()
var
    SalesHeader: Record "Sales Header";
    AutoEmailMgmt: Codeunit "SIMC Auto Email Management";
    AEL: Record "SIMC Auto Email Log";
    FoundAEL: Record "SIMC Auto Email Log";

begin
    // Scenario 1 log entry created for sales order when logged to email
    Initialize();
    Commit;
    LibraryLowerPermissions.Set0365BusFull();
    // Given Create Sales Order
    LibrarySales.CreateSalesHeader(SalesHeader, SalesHeader."Document Type"::Order, '10000');
    // When Log Email
    AutoEmailMgmt.LogEmail(AEL."Document Type"::"Sales Order", SalesHeader."No.", false);
    AutoEmailMgmt.SendEmails();
    // Then 1 log entry with correct document type and number
    FoundAEL.FindFirst;
    Assert.AreEqual(1, FoundAEL.Count, 'Auto Email log must have 1 record.');
    Assert.AreEqual(AEL."Document Type"::"Sales Order", FoundAEL."Document Type", 'Auto Email Log Doc Type = Sales Order');
    Assert.AreEqual(SalesHeader."No.", FoundAEL."Document No.", 'Auto Email Log Sales Order No. = Found Sales Order No.')
end;
```

# Test Example 2

```
[Test]
0 references
Procedure TestTrialExpiredSubscription()
var
    AutoEmailSub: Codeunit "SIMC Auto Email Subscription";
    AutoEmailSetup: Record "SIMC Auto Email Setup";
    SubStatus: Option InTrial, TrialExpired, SubExpires, SubExpired, CompanyError, SubActive;
    SubStatus2: Option InTrial, TrialExpired, SubExpires, SubExpired, CompanyError, SubActive;
    DaysLeft: Integer;

begin
    Initialize();
    // Scenario Trial Subscription Enabled and expired
    // Given Today's date, check status
    AutoEmailSetup."Trial Period":= true;
    AutoEmailSetup."Expiration Date":= today-30;
    AutoEmailSetup.Modify();
    Commit;
    LibraryLowerPermissions.SetO365Full();

    // When Role Center is opened
    // Then Status=TrialExpired;
    SubStatus2:= SubStatus2::TrialExpired;
    AutoEmailSub.GetSubscriptionStatus(Today,SubStatus,DaysLeft);
    Assert.AreEqual(SubStatus,SubStatus2,'Status should be Trial Expired');
end;
```

# Monetization

CRONUS USA, Inc. | Finance ▾ Cash Management ▾ Sales ▾ Purchasing ▾ Approvals ▾ Self-Service ▾

Customers Vendors Items Bank Accounts Chart of Accounts

X Thank you for trying out the Auto Email app. Your trial period expires in 30 days. Contact SimCrest, Inc. for a subscription. Contact us

### Auto Email Setup

Process | Actions Less options

Subscription Process Emails Email Templates Create Email Templates Create Job Queue Entry Email Attachments Email Log

General >

Statement Options >

Email Templates >

License ①

Expiration Date ..... 4/28/2019 Licensed Company Name .....

Trial Period .....  Don't show subscription notifications

# Monetization: Activation Code

App Code: AEM (Auto Email)

Company Name: CRONUS USA Inc.

Activation code: 9384kskhf\$3#2>,73J9aq0-6

Expiration Date: 05/05/2020

# Monetization Activation

## Auto Email Setup

Process | Actions Less options

**Subscription**  Process Emails  Create Email Templates 

Send from Email Address .....

Send From Email Name .....

Test Mode .....

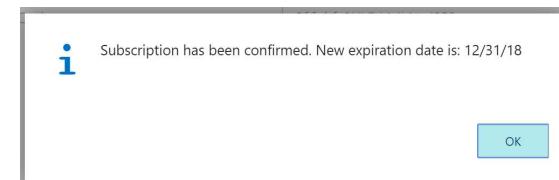
## Activation

Process | Actions Less options

**Activate Subscription** 

**Subscription Activation**

Activation Code .....



# Monetization – Check if product enabled

```
2 references
procedure CheckProductEnabled(): Boolean;
var
    DaysLeft: Integer;
    ErrorMessage: Text;
    IssueDetected: Boolean;
    SubStatus: Option InTrial,TrialExpired,SubExpires,SubExpired,CompanyError,SubActive,ActivationError,TrialError;
begin
    GetSubscriptionStatus(Today(), SubStatus, DaysLeft);
    case SubStatus of
        SubStatus::TrialExpired:
            Error(TrialExpiredMsg);
        SubStatus::TrialError:
            Error(TrialCodeErrorMsg, AppName);
        SubStatus::SubExpired:
            Error(RegularExpiredMsg);
        SubStatus::CompanyError:
            begin
                ProductSetup.Get();
                Error(CompanyErrorMsg, AppName, ProductSetup."Licensed Company Name");
            end;
        SubStatus::ActivationError:
            CheckActivationCode(true, IssueDetected, ErrorMessage);
    end;
    exit(true);
end;
```



# **Let's Stay Connected**

**chowitz@simcrest.com**

This presentation is available at <https://github.com/SimCrestInc/DirectionsLasVegas2019>