The ABL Keeps Getting Better

What's New in the ABL – 11.4 & 11.5

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#APJSpark

Agenda

- 11.4
  - OOABL serialization
  - FINALLY block
  - GET-CLASS
  - JSON Before-Image Support
  - 64-bit WebClient
- 11.5
  - ABL widget enhancements
  - Additional CAN-DO functionality
  - Coexistent installation of 32-bit and 64-bit OpenEdge

11.4

Object Serialization – Motivation

Problem

- There is no standard way to get error information from the AppServer to a client
- There is no way to pass OOABL objects between an ABL client and an AppServer

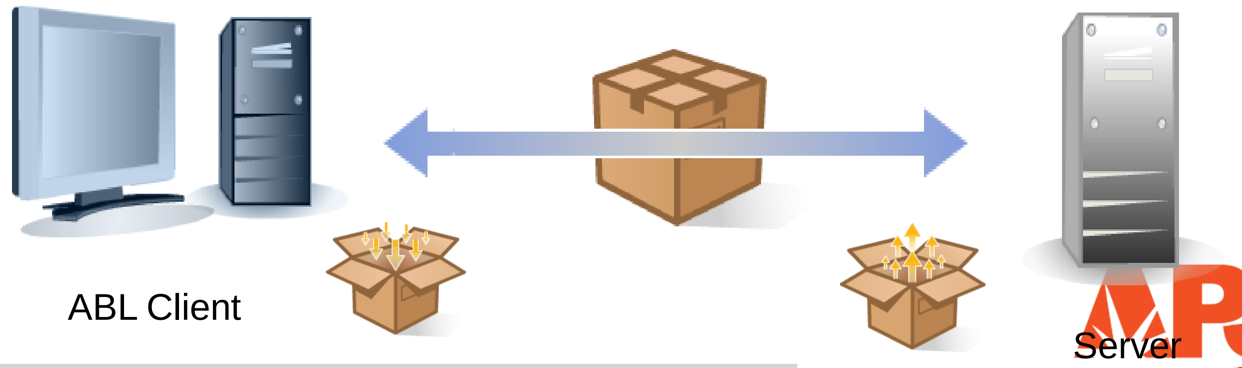
Solution

Introduce built-in OOABL object serialization

- Works between an ABL client and an AppServer
  - Not Open Client

Object Serialization in the ABL

- Use Cases
  - Throwing an error object from the AppServer to an ABL client
  - Passing an object between an ABL client and an AppServer
  - Passing temp tables that contain ABL object fields between an ABL client and an AppServer
- Rules for serialization and deserialization
- Futures Roadmap

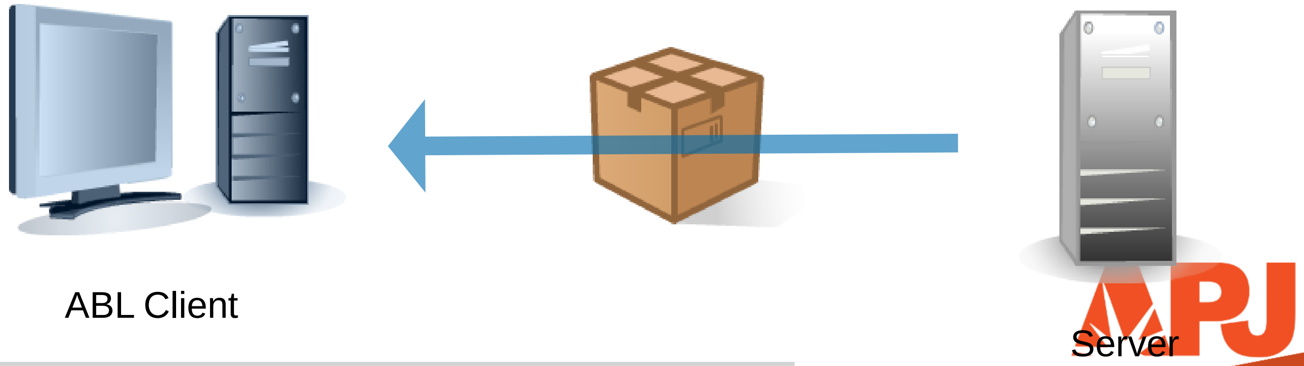


Throwing an Error Object – 11.4

```
RETURN ERROR New Progress.Lang.AppError(…).
```

```
ROUTINE-LEVEL ON ERROR UNDO, THROW.
```

```
CATCH err AS Progress.Lang.Error:
    UNDO, THROW err.
END.
```



Throwing an Error Object

Pre - 11.4	11.4
Raises ERROR on client	Raises ERROR on client
Generated warning in the AppServer log file	
No object instance returned	Object instance returned
Not even error message available on the client	Error message and all other object data available on the client

What Objects Can You Throw?

- Classes which implement **`Progress.Lang.Error`**, for example,
  - **`Progress.Lang.SysError`**
  - **`Progress.Lang.AppError`**
  - **`Progress.Lang.JsonError`**
  - **`Progress.BPM.BPMError`**

  - Any user-defined class that implements Progress.Lang.Error
    - Typically subclass of Progress.Lang.AppError
    - Must be marked SERIALIZABLE

- Not .NET Exceptions

Error Object – CallStack

- Error objects can contain Callstack information
  - SESSION:ERROR-STACK-TRACE attribute to TRUE
  - -errorstack startup parameter

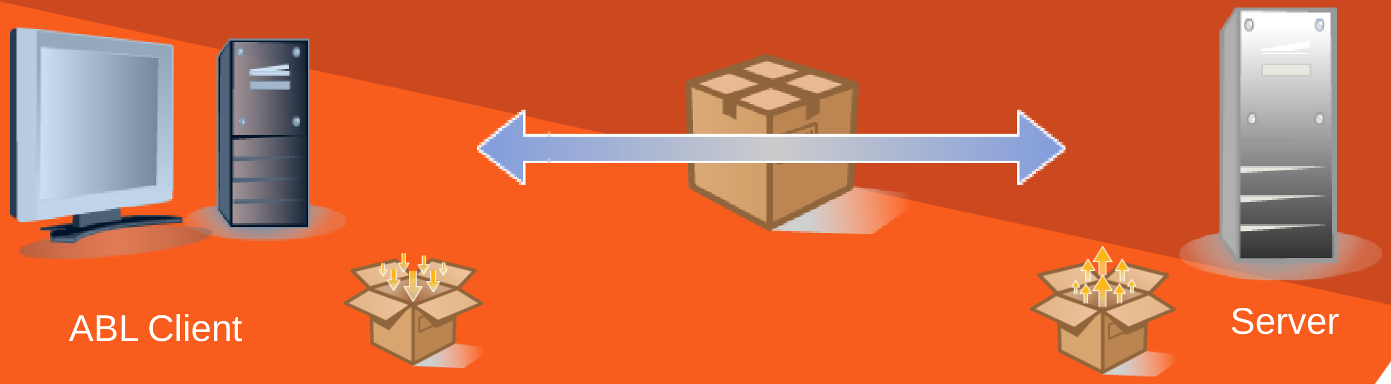
- Callstack augmented with info from <u>both</u> client and AppServer call stacks

```
getCust.p at line 20  (c:\OO\getCust.p)
runit.p at line 2  (c:\OO\runit.p)


Server StackTrace:
serverCust.p at line 8  (./serverCust.p)
```

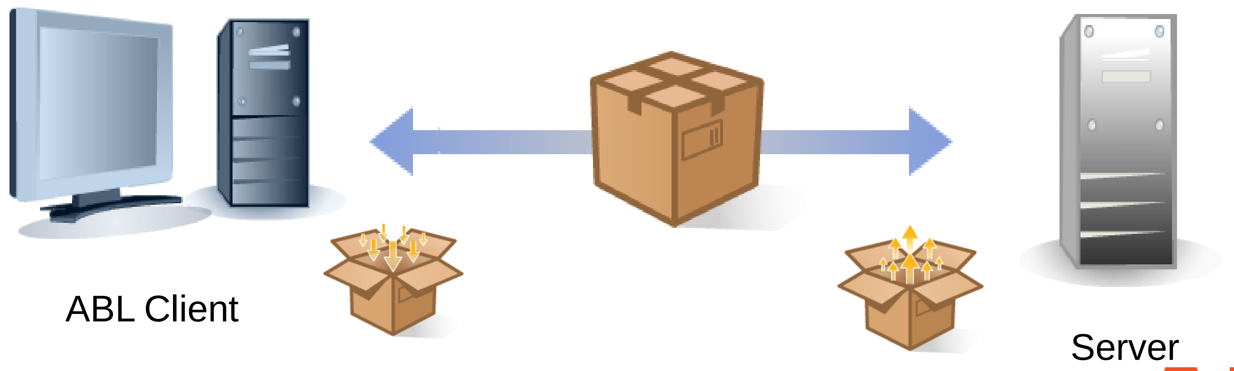
RUN serverCust.p ON SERVER hSrvr.

Passing Objects between Client and Appserver



OO ABL Serialization

- How objects get passed between a client and an AppServer
- What objects can be serialized?
- Compatibility between client & server
- Serialization rules
- Deserialization rules



Passing OOABL Objects

- **Parameters**

```
RUN proc.p ON SERVER hsrv (INPUT myCustInfo).
```

- **Return Values**

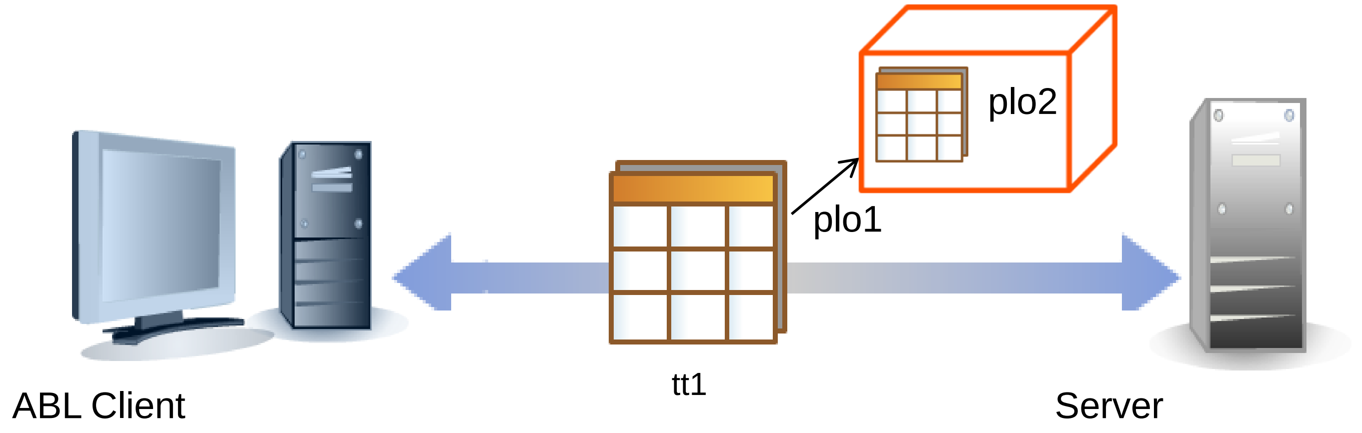
```
DEFINE VAR myCustInfo AS CustInfo.

FUNCTION getData RETURNS CustInfo () IN hRemoteProc.
…
RUN CustServices.p ON SERVER hsrv SET hRemoteProc.
…


myCustInfo = getData().
```

Passing Remote Temp-tables Containing ABL Object Fields

- **Restriction lifted**
  - Pass temp-table to AppServer if it contains an OOABL object
  - Field is still defined as **`Progress.Lang.Object`**
- **TT can contain object instance, which can contain TT…**



SERIALIZABLE

- Indicates objects of the class can be passed between an AppServer and a remote client

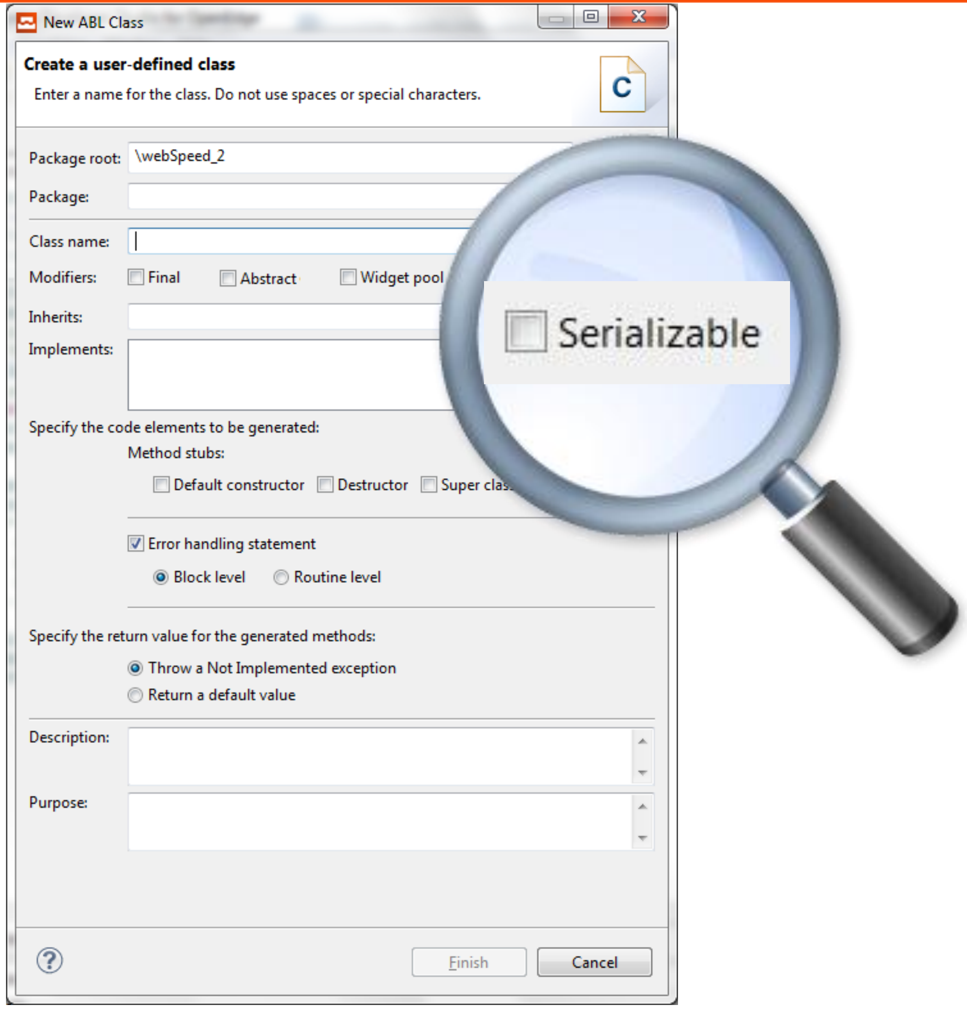
```
CLASS CustInfo INHERITS Info SERIALIZABLE:

   ...

END.
```

- Every class in hierarchy must be marked SERIALIZABLE
- Cannot be used with ABL-extended .NET classes

SERIALIZABLE – PDSOE



New ABL Class

Create a user-defined class

Enter a name for the class. Do not use spaces or special characters.

Package root: \webSpeed_2

Package:

Class name:

Modifiers: ☐ Final ☐ Abstract ☐ Widget pool

☐ Serializable

Inherits:

Implements:

Specify the code elements to be generated:

Method stubs:

☐ Default constructor ☐ Destructor ☐ Super clas

☑ Error handling statement

(● Block level) ○ Routine level

Specify the return value for the generated methods:

(● Throw a Not Implemented exception)

○ Return a default value

Description:

Purpose:

Finish Cancel

Serializable Built-in OOABL Objects

- **Serializable**
  - Classes that implement Progress.Lang.Error
  - Progress.Json.ObjectModel.JsonObject
  - Progress.Json.ObjectModel.JsonArray
  - Progress.Json.ObjectModel.ObjectModelParser
    - Any **built-in** sub-class of any of these
  - Progress.Lang.Object

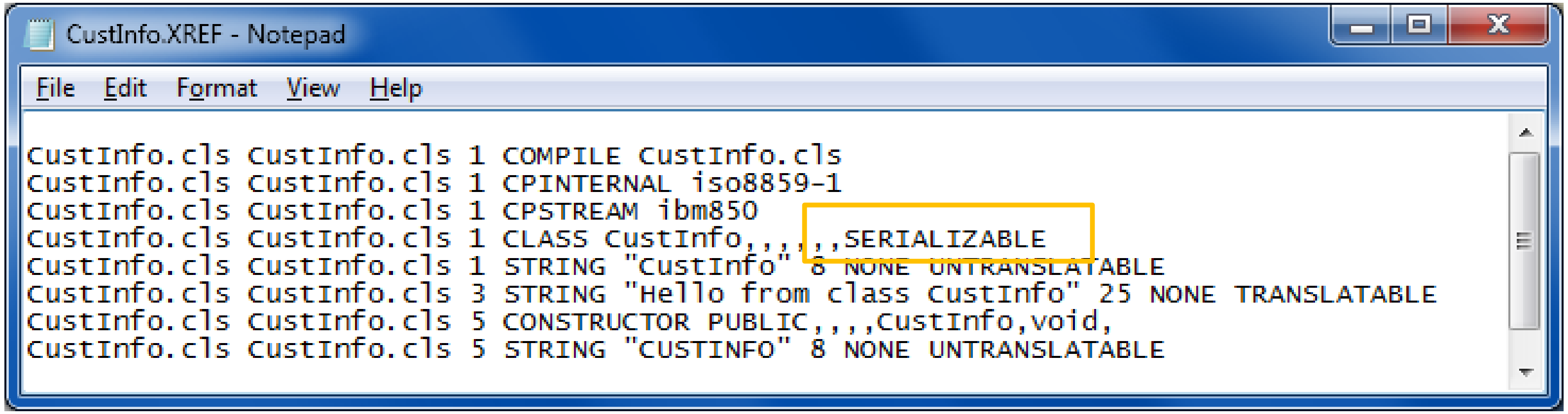
- **Not serializable** – everything else, for example:
  - Progress.Security.DB.Policy
  - Progress.Database.TempTableInfo
  - Progress.BPM.DataSlot
  - Progress.Lang.Class

Update to Object Reflection

- **IsSerializable method of Progress.Lang.Class**
  - Indicates whether the object is SERIALIZABLE
  - Use at run-time or for tooling

```
DEFINE VAR cls AS Progress.Lang.Class
cls = Progress.Lang.Class:GetClass("CustInfo").
MESSAGE cls:IsSerializable() VIEW-AS ALERT-BOX.
```

Update to COMPILE XREF, COMPILE XREF-XML



```
CustInfo.cls CustInfo.cls 1 COMPILE CustInfo.cls
CustInfo.cls CustInfo.cls 1 CPINTERNAL iso8859-1
CustInfo.cls CustInfo.cls 1 CPSTREAM ibm850
CustInfo.cls CustInfo.cls 1 CLASS CustInfo,,,,,,SERIALIZABLE
CustInfo.cls CustInfo.cls 1 STRING "CustInfo" 8 NONE UNTRANSLATABLE
CustInfo.cls CustInfo.cls 3 STRING "Hello from class CustInfo" 25 NONE TRANSLATABLE
CustInfo.cls CustInfo.cls 5 CONSTRUCTOR PUBLIC,,,,CustInfo,void,
CustInfo.cls CustInfo.cls 5 STRING "CUSTINFO" 8 NONE UNTRANSLATABLE
```

```
<Class-ref>

        <Source-guid>t6BMga8eOYXVE8DcTJMLng</Source-guid>
        <Ref-seq>4</Ref-seq>
        <Inherited-list/>
        …

        <Is-final>true</Is-final>
        <Is-serializable>true</Is-serializable>
```

Version Compatibility

- **Both sides must be at least 11.4**
  - 11.4 client -> older AppServer
    - Parameter passing errors
  - 11.4 AppServer -> older client
    - OOABL error object not thrown
    - Parameter passing errors

Version Compatibility – `VersionInfo` Class

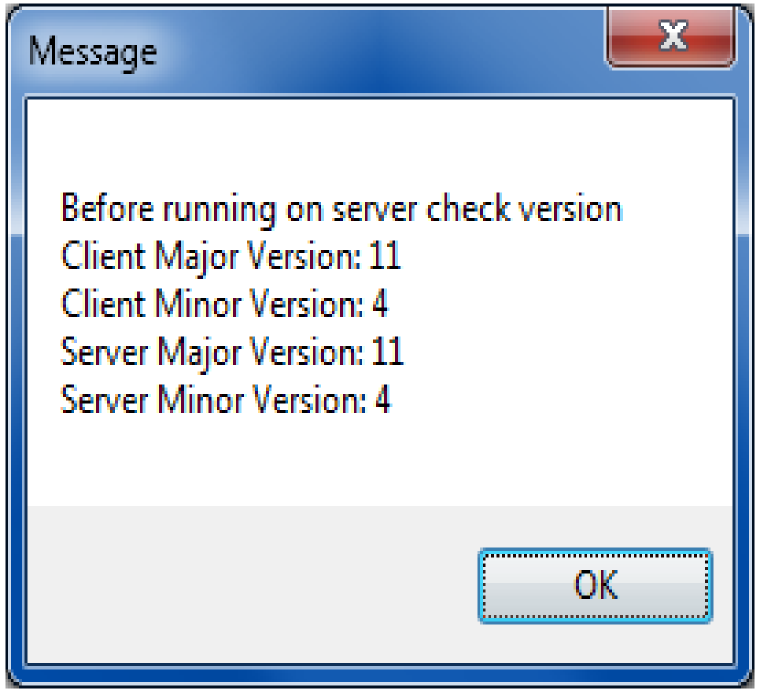
```
DEFINE VARIABLE hServer AS HANDLE.
DEFINE VARIABLE clientVersionInfo AS Progress.Lang.OEVersionInfo.
DEFINE VARIABLE serverVersionInfo AS Progress.Lang.OEVersionInfo.

CREATE SERVER hServer.
hServer:CONNECT("-AppService asbroker1 -H localhost -S 3090") NO-ERROR.

IF hServer:CONNECTED() THEN
DO:
    clientVersionInfo = hServer:REQUEST-INFO:VersionInfo.
    serverVersionInfo = hServer:RESPONSE-INFO:VersionInfo.

    MESSAGE "Before running on server check version" SKIP
        "Client Major Version:" clientVersionInfo:OEMajorVersion SKIP
        "Client Minor Version:" clientVersionInfo:OEMinorVersion SKIP
        "Server Major Version:" serverVersionInfo:OEMajorVersion SKIP
        "Server Minor Version:" serverVersionInfo:OEMinorVersion SKIP
        VIEW-AS ALERT-BOX.

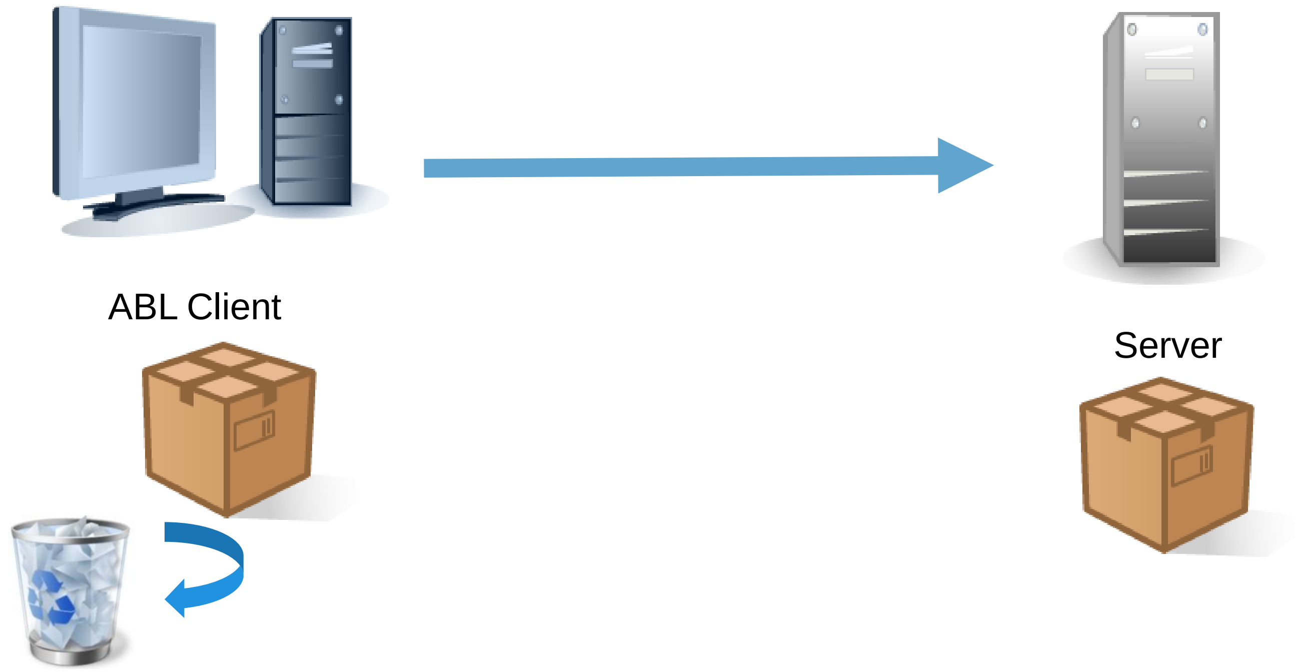
    IF serverVersionInfo:OEMinorVersion >= 4 THEN DO:
        ...
    END.
END.
```



```
Before running on server check version
Client Major Version: 11
Client Minor Version: 4
Server Major Version: 11
Server Minor Version: 4
```

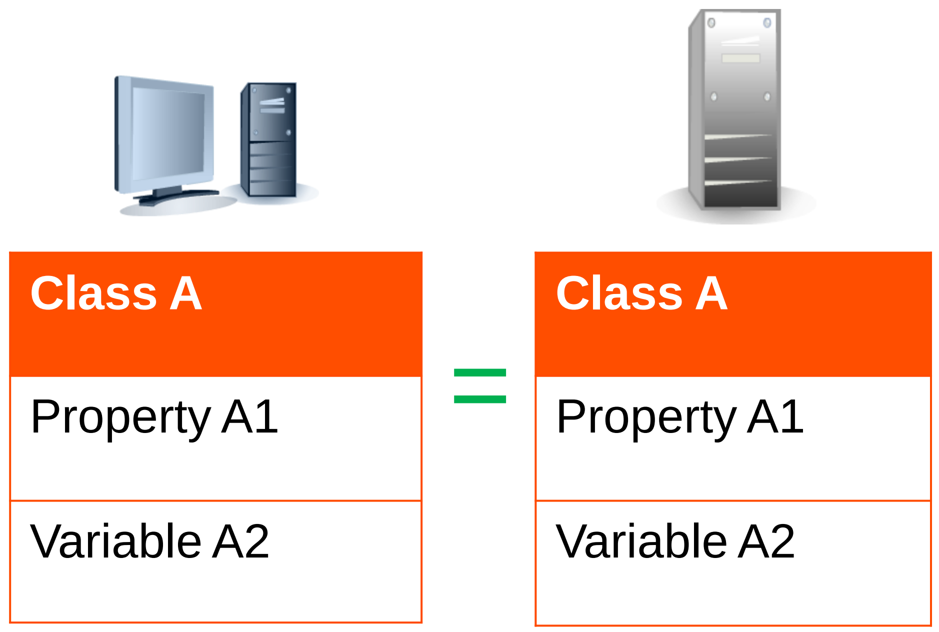
Serialization Model

- **Pass by value**
  - Receiving side creates **new** object instance
  - Either instance may get garbage collected



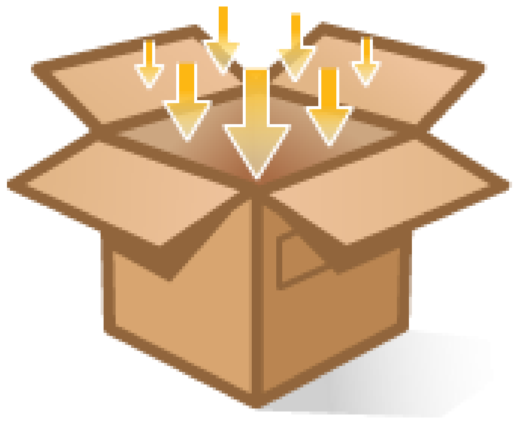
Compatibility: Class Definitions

- **Class definitions on Client and AppServer must be the “*same*”**
  - Method signature and data members must match ***exactly***
- **What if they are different?**
  - An error is raised on the RUN statement
- **AVM does not check if the business logic matches**
  - Constructor, method or property getter/setter code can be different
  - API the same, r-code is different



What Gets Serialized?

- **All instance data members are serialized**
  - Variables
  - Properties
  - ProDataSets
  - Temp-tables
- **All access modes**
  - Public, Protected, Private
- **Static data members are NOT serialized**
- **Property getters**
  - Not invoked
  - Value is copied



Serialization Rules – Special Cases

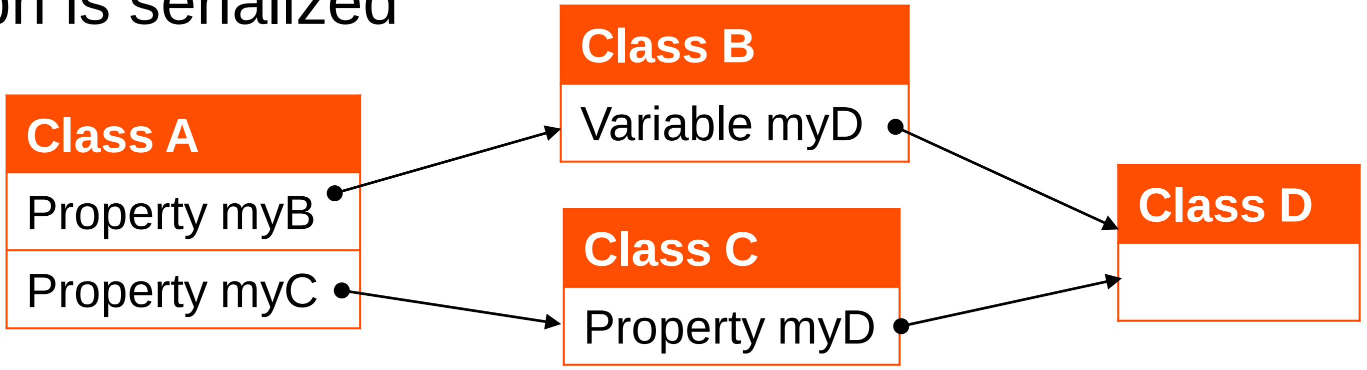
- **MEMPTRs**
  - Serialize if allocated by the ABL application
  - Not serialized if allocated from external sources
    - DLL or shared library
    - Set to Unknown when the object is deserialized
- **Handle-based variables** (e.g., widgets, queries, buffers)
  - Serialized with the handle value
  - Widget/object referenced by the handle is not serialized
  - Only useful to round-trip data
- **Cannot serialize .NET or ABL-extended .NET objects**
  - AVM raises an error

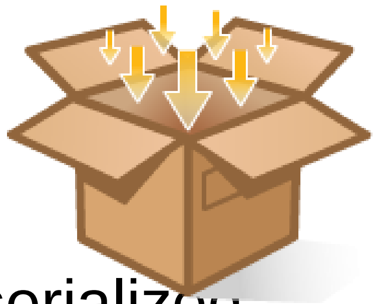
Serialization Rules – State

- The AVM does not maintain state of class instance
  - Open queries/cursor position
  - Buffer contents
  - Open files
  - Streams
  - Event subscriptions

Serialization Rules – Object Relationships

- Deep-copy
  - Serialize data member object references
  - Object graph is serialized

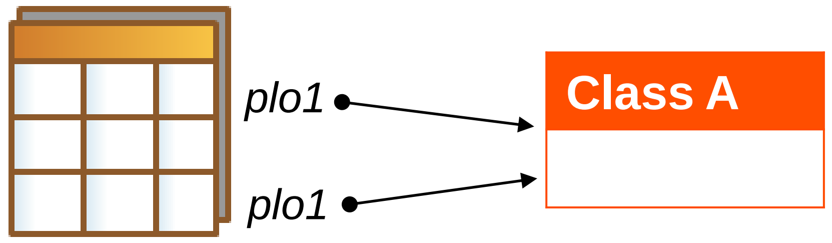




  - Only 1 instance of Class D is serialized

Temp-Tables and Object Fields

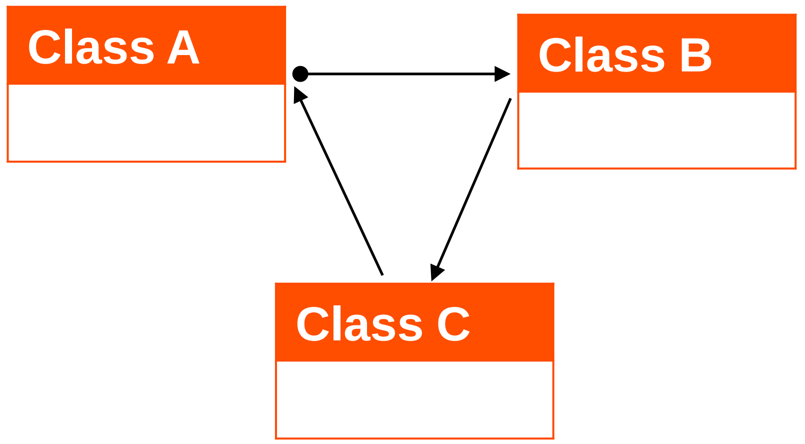
- Multiple references to one instance
  - Instance uniqueness is maintained



  - Only 1 instance of Class A is serialized

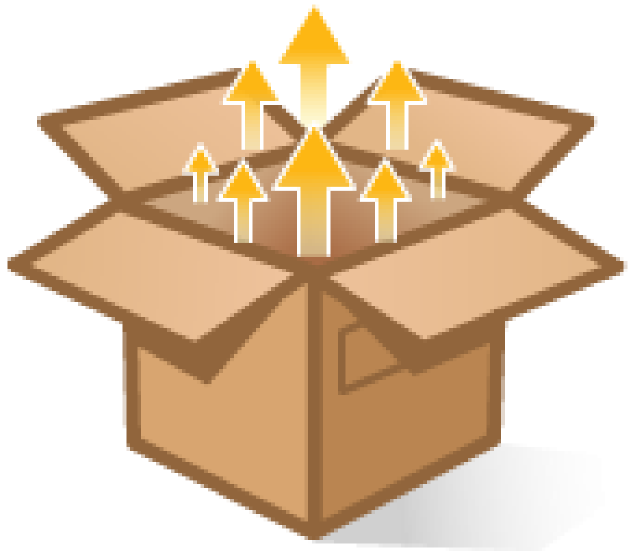
Circular References

- Circular references are detected and **OK**
  - No infinite loop



Deserialization Rules

- Creating the new instance
  - Instance Constructor not invoked
  - Property Setters not invoked
- Only the object’s data is deserialized
  - R-code must already exist on both sides of the wire



DynObjects Logging

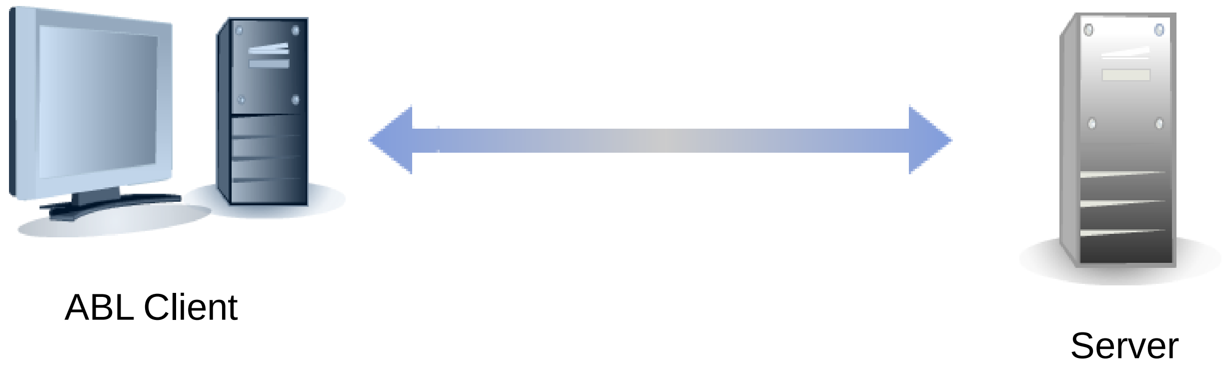
- DynObjects logging includes objects created by deserialization
- Use LOG-ENTRY-TYPES: DynObjects.Class

```
RUN objParm.p ON hServer (INPUT NEW classA()).
```

```
[14/07/21@13:56:26.322-0400] P-008364 T-009896 3 AS DYNOBJECTS     Created
  Progress.Lang.Object    Handle:1000 (objParm.p @ 0) classA
```

Serialization of Character Data

- Character data serialized via sender's **`–cpinternal`**
- Character data deserialized via receiver's **`–cpinternal`**
- Longchar same rules apply except if:
  - Codepage fixed with **`FIX-CODEPAGE`**



Character –cpinternal ***Character –cpinternal***

- Runtime error can be raised during conversion

Object Serialization – On the Roadmap

- Transient data (do not serialize)
- Provide object serialization to disk
  - Binary format
  - JSON
  - XML

```
DEFINE PUBLIC VARIABLE x AS INT.
DEFINE PUBLIC VARIABLE y AS INT.
DEFINE PUBLIC VARIABLE z AS INT.
```

- Provide options to support "relaxed" levels of client/server matching:
  - Exact match for public and protected members only
  - Match by data members name & type

```
DEFINE PUBLIC VARIABLE y AS INT.
DEFINE PUBLIC VARIABLE x AS INT.
DEFINE PUBLIC VARIABLE w AS INT.
```

- Application defined (via callback)

Agenda

- OOABL serialization
- FINALLY block
- GET-CLASS
- JSON Before-Image Support
- 64-bit WebClient

FINALLY Block – Motivation

Problem

Flow-of-control statements in a FINALLY block may conflict with associated block

```
DO TRANSACTION:
    UNDO THROW myAppError.
END.

FINALLY:
    RETURN.
END.
```

S

We changed how the AVM handles flow-of-control statements in a FINALLY block

FINALLY Block

Associated Block	FINALLY block	Caller
Return 1	Return 2	2
Error 1	RETURN, NEXT, LEAVE, RETRY	**Error 1**

- 2nd line is new behavior in 11.4
- Best Practice: Avoid flow-of-control conflicts between Associated block and FINALLY block

Agenda

- OOABL serialization
- FINALLY block
- GET-CLASS
- JSON Before-Image Support
- 64-bit WebClient

GET-CLASS – Motivation

Problem – Prior to 11.4

- ABL supports Progress.Lang.Class:GetClass(<type-name-exp>)
- This does not provide *compile time* validation of type-name-exp

Solution

- Introduce GET-CLASS built-in function
- Accepts a type-name parameter
  - not a character expression

GET-CLASS

- Syntax

```
GET-CLASS(<type-name>).
```

- Returns a Progress.Lang.Class
- USING statements are applied to a non-qualified name
- Compiler error if not found

Agenda

- OOABL serialization
- FINALLY block
- GET-CLASS
- JSON Before-Image Support
- 64-bit WebClient

JSON – Before-Image – Motivation

Problem

- Lack of serialize / deserialize for a ProDataSet with before-image data to JSON
- Out of step with XML support
- **Mobile**

Solution

- Optional before-image data in JSON for ProDataSets

JSON – Before-Image – Motivation

- **You cannot reliably save ProDataSet changes to the DB w/o a before-image**
  - You cannot know if another user has changed the data first.
- **Mobile**
  - Original version – “built-in” method for update only handled 1 record at a time.
    - Application would have to do its own before-image caching and checking
  - In 11.4 – Added ability to return a **set** of records in a ProDataSet.
    - Requires reliable SAVE-ROW-CHANGES – need Before-image Information
- **Offline support**
  - Make updates to a ProDataSet; Save to JSON since DB is unavailable
  - Read back later when connected and do SAVE-ROW-CHANGES

JSON – Before-Image Syntax

- Syntax:

```
WRITE-JSON ( target-type , { file | stream | stream-handle | memptr | longchar }
    [ , formatted [ , encoding [ , omit-initial-values
    [ , omit-outer-object [ , write-before-image ] ] ] ] ] )
```

- Exa

```
DEFINE VARIABLE writeBI AS LOGICAL INIT YES.

DATASET dset:WRITE-JSON ( “File”, “test.json”, YES, "UTF-8“, YES,
                                              NO, YES).
```

- No

ProDataSet – JSON Output

After table (current state)

```
{"dsCustomer": {
  "prods:hasChanges": true,
  "ttCust": [
    {
      "prods:id": "ttCust10497",
      "prods:rowState": "modified",
      "CustNum": 2,
      "NAME": "Urpon Frisbee_NewName",
      "Balance": 903.64
     },
```

Before table

```
"prods:before": {
    "ttCust": [
     {
      "prods:id": "ttCust10497",
      "prods:rowState": "modified",
      "CustNum": 2,
      "NAME": "Urpon Frisbee",
      "Balance": 437.63
     },
```

Record marked as "modified"

ProDataSet – Before Table May Also Indicate Row Error

```
…
"prods:before": {
  "ttCust": [
    {
      "prods:id": "ttCust10520",
      "prods:rowState": "deleted",
     "prods:hasErrors": true,
      "CustNum": 3,
      "NAME": "Hoops",
      "Balance": 1199.95
    },
  …
"prods:errors": {
  "ttCust": [
    {
      "prods:id": "ttCust10520",
       "prods:error" : "error-string“
    }, …
```

Error associated with this row

If row not deleted, hasErrors would be in after table instead

Agenda

- OOABL serialization
- FINALLY block
- GET-CLASS
- JSON Before-Image Support
- 64-bit WebClient

WebClient – Windows 64-bit

Problem – Since 11.3

- Provided a 64-bit GUI client
- Missing functionality – no support for 64-bit WebClient

Solution

WebClient application can be defined as supporting

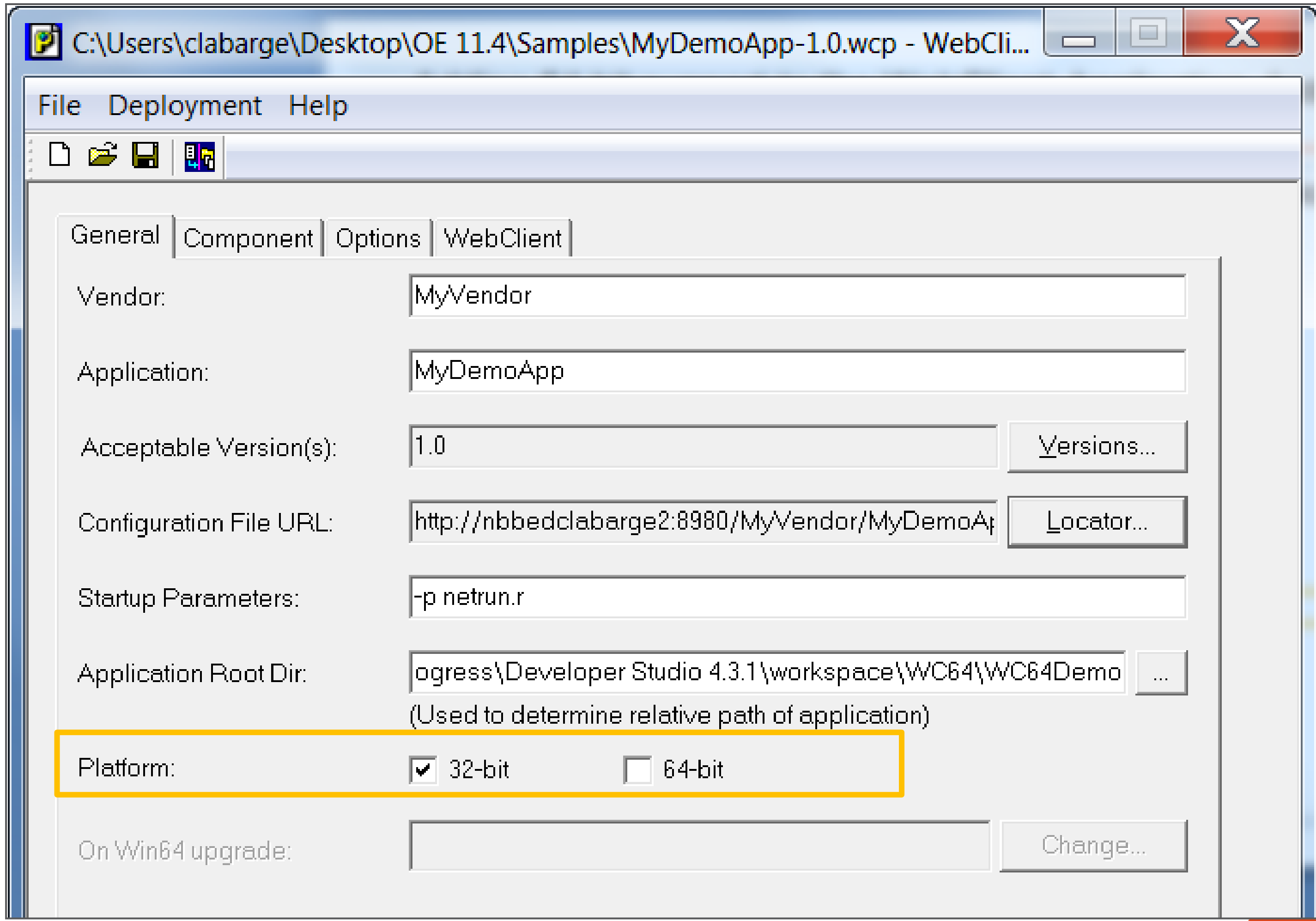
- 32-bit platform
- 64-bit platform
- Either, depending on target machine

WebClient – Windows 64-bit

- **When your application gets deployed**
  - WebClient (i.e., the Progress AVM) is installed if not already there
  - The app gets installed
    - In general ABL code is not impacted by 32-bit vs. 64-bit
    - If it is, it can/should be conditionalized to support both versions
    - But the install is targeted for **either** 32-bit or 64-bit
      - Notably – we need to know which AVM to run
- We support both 32-bit and 64-bit WebClient on the same machine
  - 2 different applications, one 32-bit, one 64-bit
  - Do NOT support this for the GUI client in 11.4

WebClient Application Assembler – General Tab

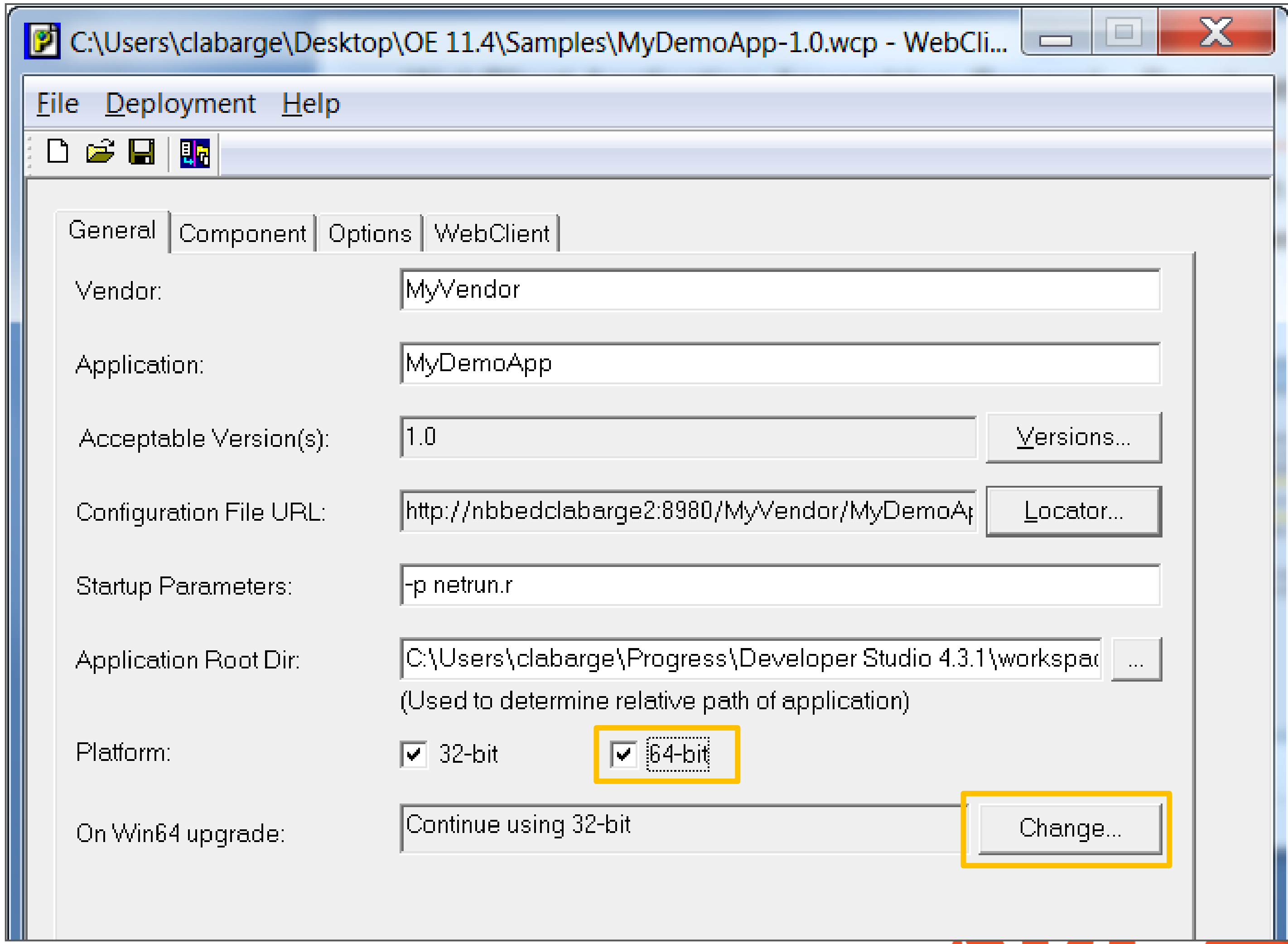
- On **General** tab, added
  - Platform toggles
    - 32-bit
    - 64-bit
  - Pick one or the other
  - Pick both:
    - Install will match the machine configuration
- Will end up with 32-bit **and** 64-bit AVM if:
  - 64-bit machine
  - Another 32-bit app already installed
  - Your app is installed as 64-bit


C:\Users\clabarge\Desktop\OE 11.4\Samples\MyDemoApp-1.0.wcp - WebCli...

Vendor: MyVendor
Application: MyDemoApp
Acceptable Version(s): 1.0
Configuration File URL: http://nbbedclabarge2:8980/MyVendor/MyDemoAp
Startup Parameters: -p netrun.r
Application Root Dir: ogress\Developer Studio 4.3.1\workspace\WC64\WC64Demo
(Used to determine relative path of application)
Platform: [✓ 32-bit] 64-bit
On Win64 upgrade:

WebClient Application Assembler – Application Upgrade

- When you select both 32-bit & 64-bit
- You, the developer, decide the **upgrade** path:
  - Continue to run the application as 32-bit
  - Uninstall 32-bit version and install 64-bit version
  - Ask the end-user: keep 32-bit or upgrade to 64-bit

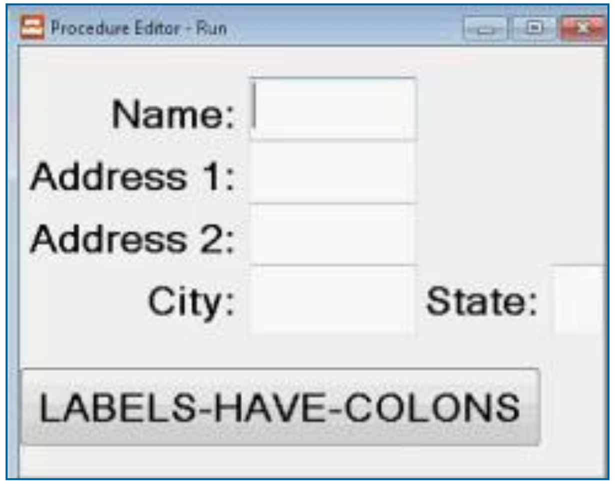


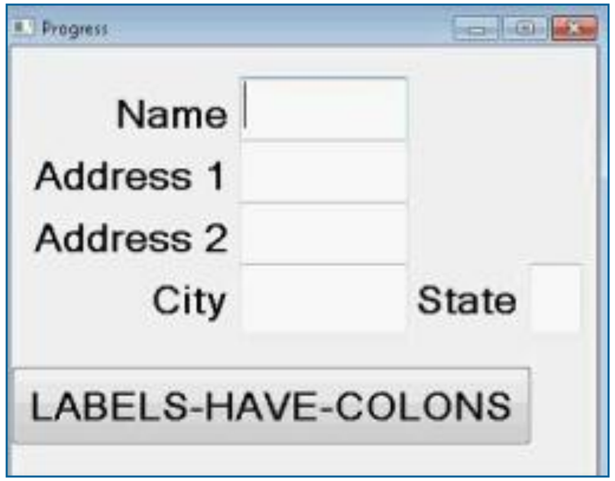
Vendor:	MyVendor
Application:	MyDemoApp
Acceptable Version(s):	1.0
Configuration File URL:	http://nbbedclabarge2:8980/MyVendor/MyDemoAp
Startup Parameters:	-p netrun.r
Application Root Dir:	C:\Users\clabarge\Progress\Developer Studio 4.3.1\workspac
	(Used to determine relative path of application)
Platform:	✓ 32-bit ✓ 64-bit
On Win64 upgrade:	Continue using 32-bit

11.5

ABL widget enhancements

- Two new browse events
  - SCROLL-VERTICAL
  - SCROLL-HORIZONTAL
  - SCROLL-NOTIFY
- New CLEAR( ) method for individual Fill-ins
  - Works on individual fill-ins rather then all in a frame as CLEAR statement did
- -nocolon startup parameter suppress the appending of colons to static side labels





Additional CAN-DO functionality

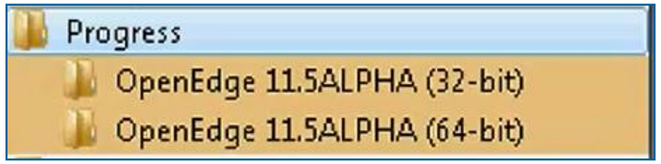
- As part of OpenEdge's implementation of multi-tenancy, the `CAN-DO` function treats "@" as the domain name delimiter in a fully qualified user ID by default and this was preventing people from using the "@" symbol as a regular character

- This release provides two ways to treat the "@" symbol as a regular character
  1. Use `-nocandodomain` startup parameter
  2. Set `CAN-DO-DOMAIN-SUPPORT` attribute on the `SECURITY-POLICY` handle to `FALSE`

- For Example:
  - When -nocandodomain is not in effect, the statement CAN-DO("abc","abc@") evaluates to TRUE because both strings are interpreted as user abc in the blank domain
  - When -nocandodomain is in effect, the statement CAN-DO("abc","abc@") evaluates to FALSE

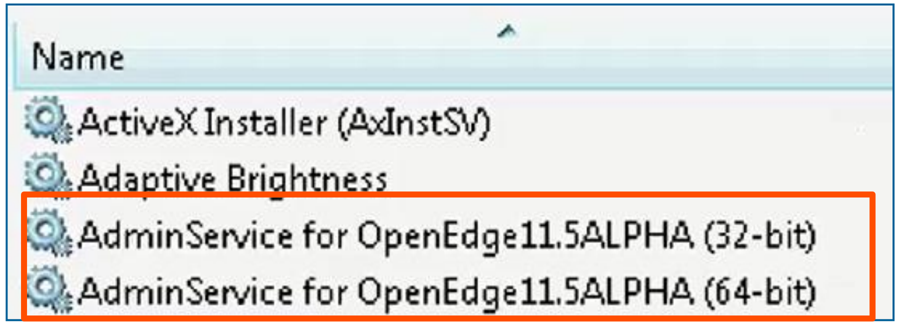
Coexistent installation of 32-bit and 64-bit OpenEdge

- **Start menus** - Coexistent install



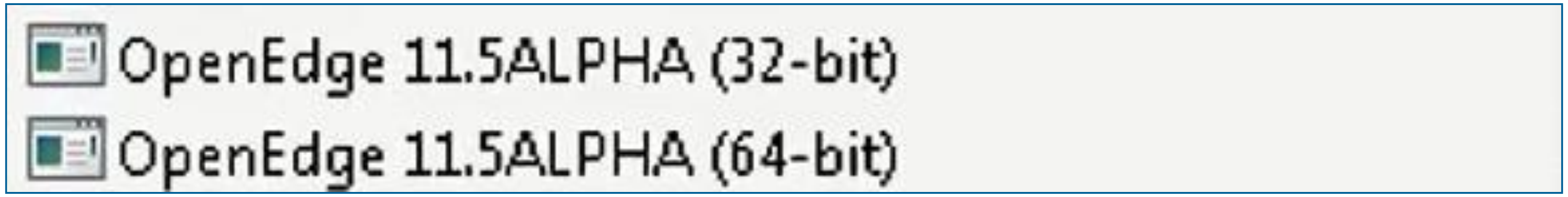
Progress
OpenEdge 11.5ALPHA (32-bit)
OpenEdge 11.5ALPHA (64-bit)

- **Services** - Coexistent Admin Servers ***only auto starts first Admin Server installed***



Name
ActiveX Installer (AxInstSV)
Adaptive Brightness
AdminService for OpenEdge11.5ALPHA (32-bit)
AdminService for OpenEdge11.5ALPHA (64-bit)

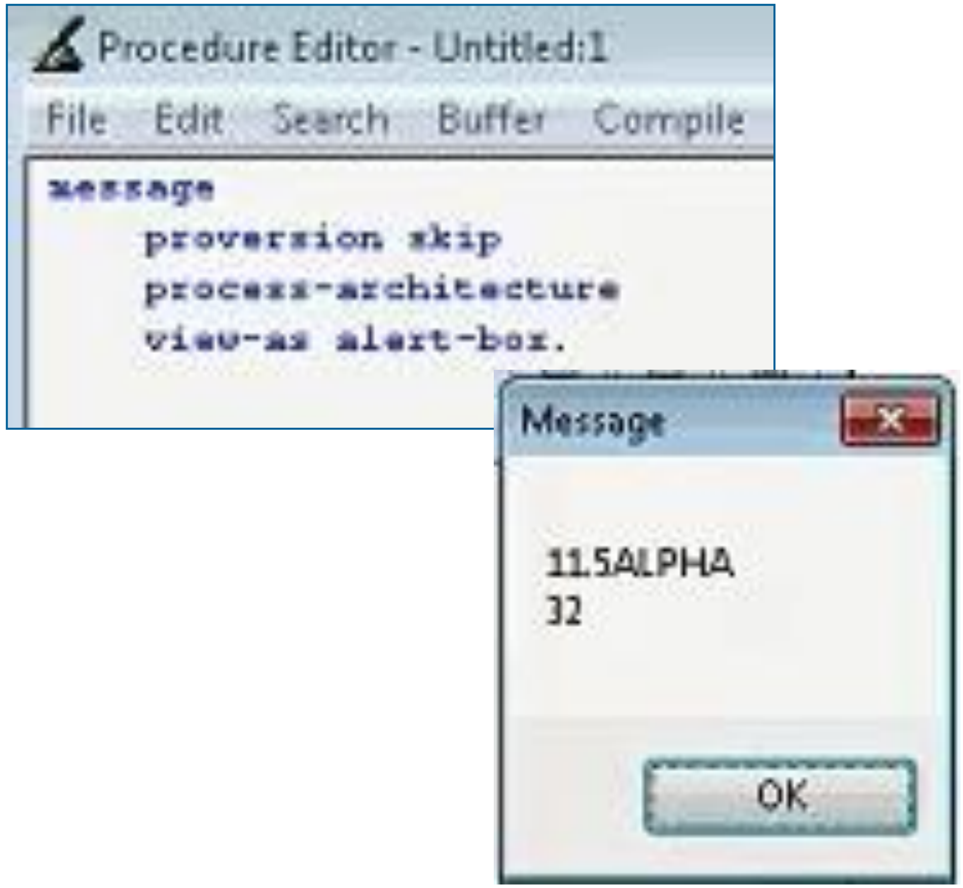
- **Control Panels > All Control Panels > Programs and Features** - Coexistent listing



OpenEdge 11.5ALPHA (32-bit)
OpenEdge 11.5ALPHA (64-bit)

Sample ABL on same machine

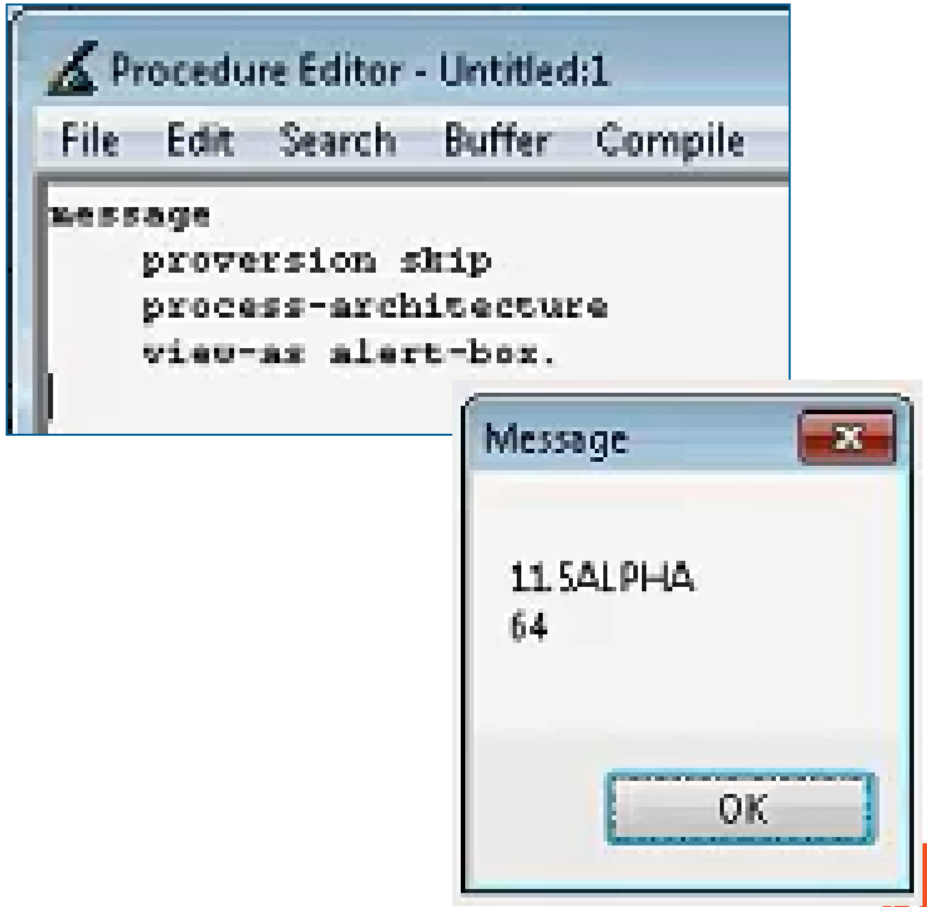
32-bit - blue font


Procedure Editor - Untitled:1
File Edit Search Buffer Compile
Message
OK

```
message
    proversion skip
    process-architecture
    view-as alert-box.
```

```
11.5ALPHA
32
```

64-bit - black font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11.5ALPHA
64
```

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