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IBM

IIBvNext and App Connect Enterprise 2: *Lightweight Integration for Microservice Architectures*

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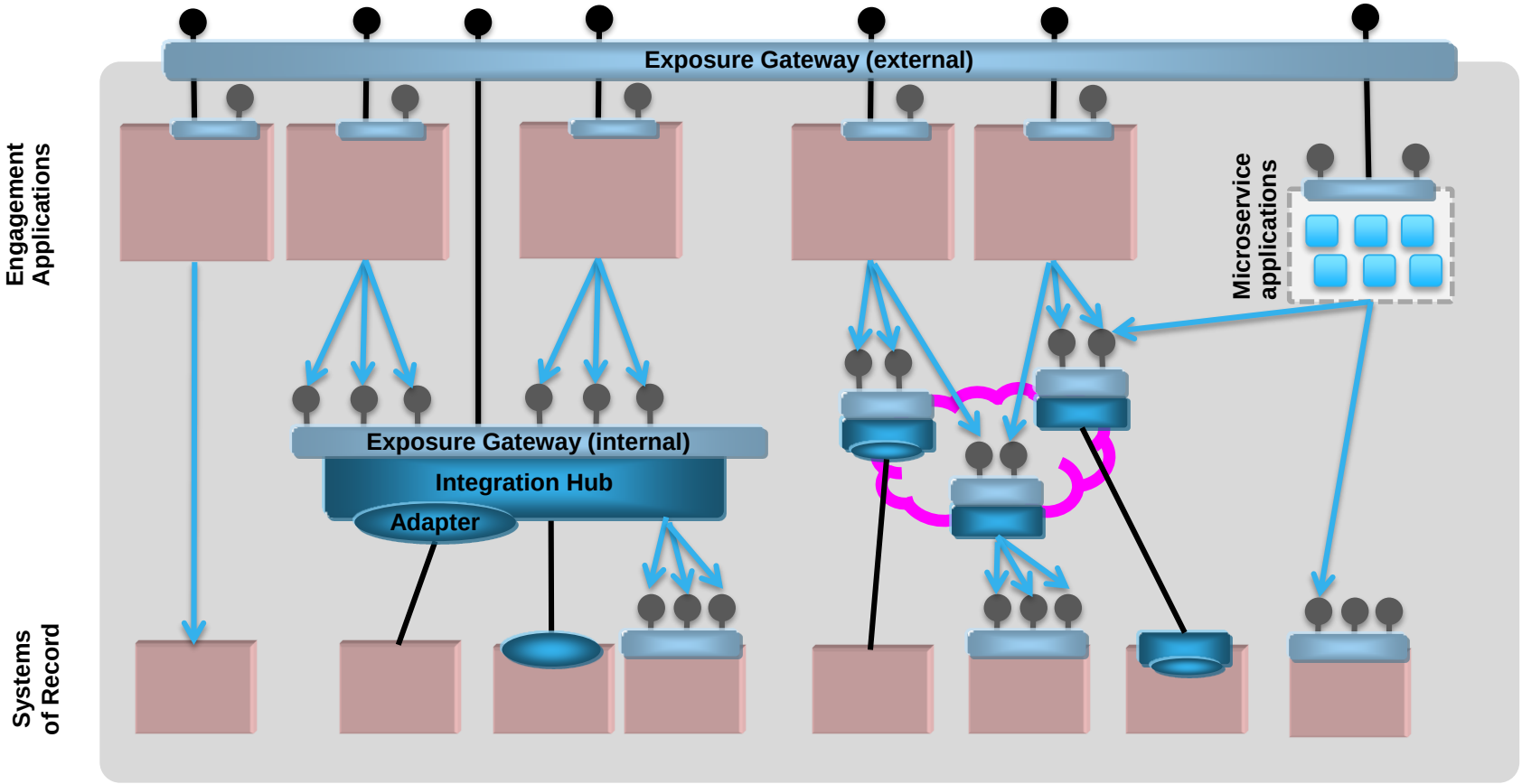
Overview

- Introduce the concept of a Standalone Integration Server
  - What is a Standalone Integration Server (SIS)?
  - Describe the capabilities that these will offer
  - Engineering changes to support these

- Improvements to all Integration Servers as part of this work
  - Integration servers in an Integration Node
  - Integration/REST API and command architecture
  - Precompiled resources, persisted overrides etc
  - “Herding” integration server processes

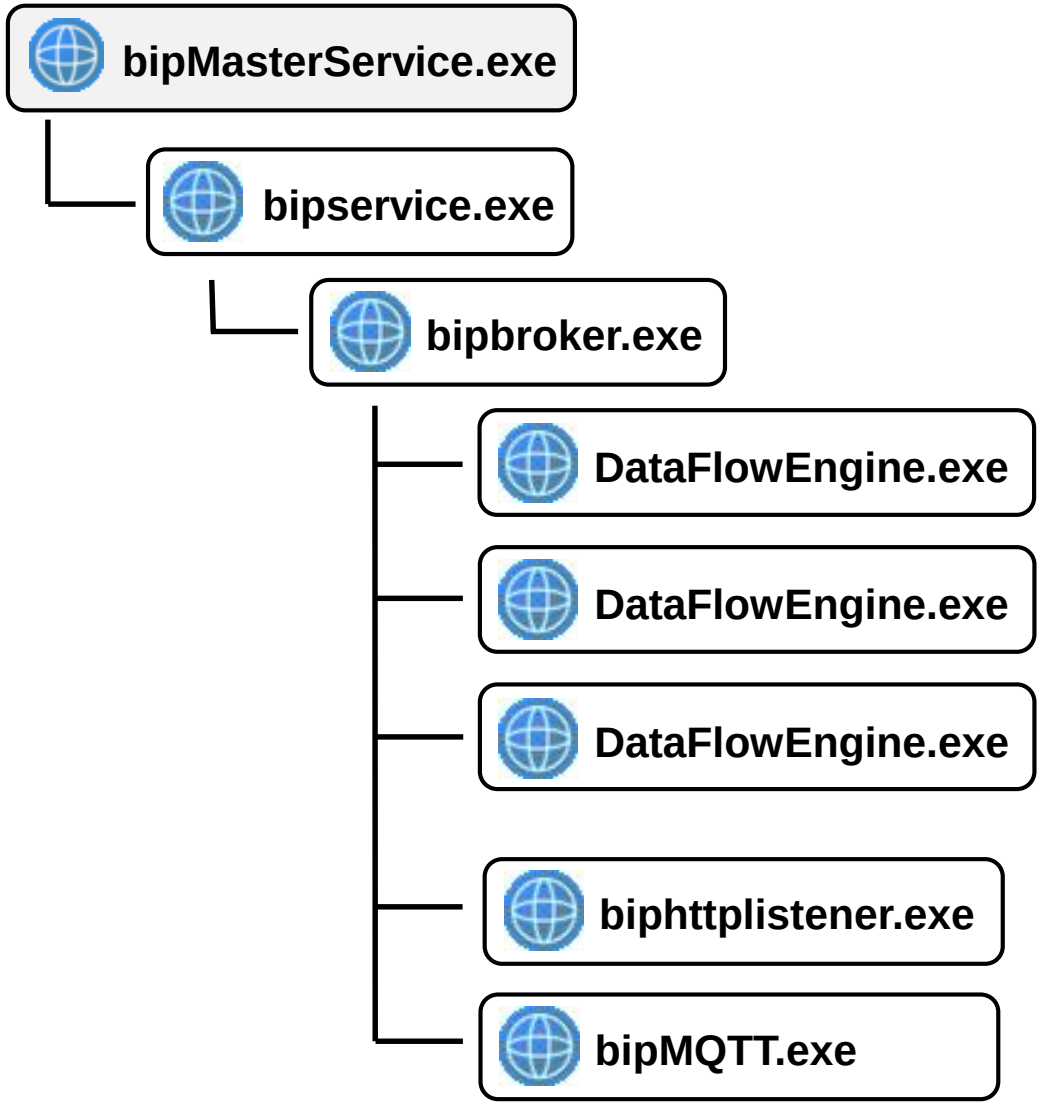
Evolving Integration architectures and the impact of Microservices



Reminder

IIB V10 Integration Node Structure

Process Overview

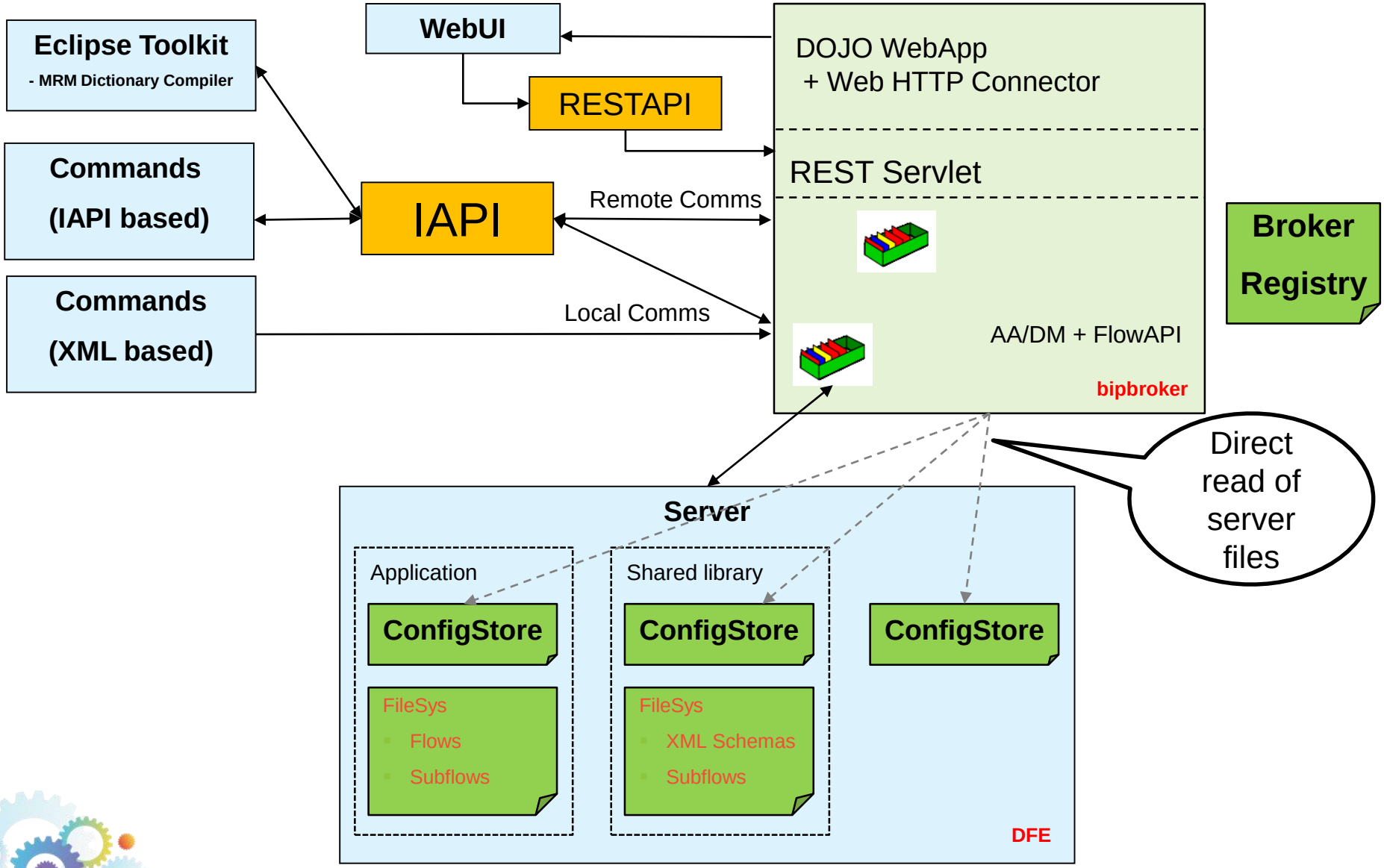


Process Overview Notes

- Process launch order:
  - When an Integration Node is started bipservice is launched
  - bipservice launches the bipbroker process
  - bipbroker launches the HTTP Listener
  - bipbroker launches its MQTT Server
  - bipbroker launches a DataFlowEngine (DFE) for each server
  - Any launching process monitors that process

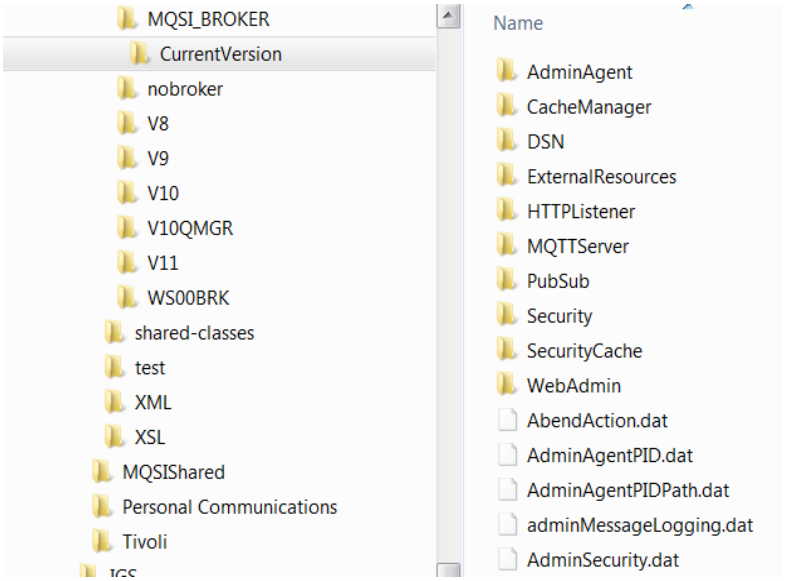
- Main process usage:
  - bipbroker handles all of the administration for a Node
  - DFE processes handle all message processing for an Integration Server
  - Integration servers cannot be administered without bipbroker.

IIB V10 Administration/Deploy chain overview

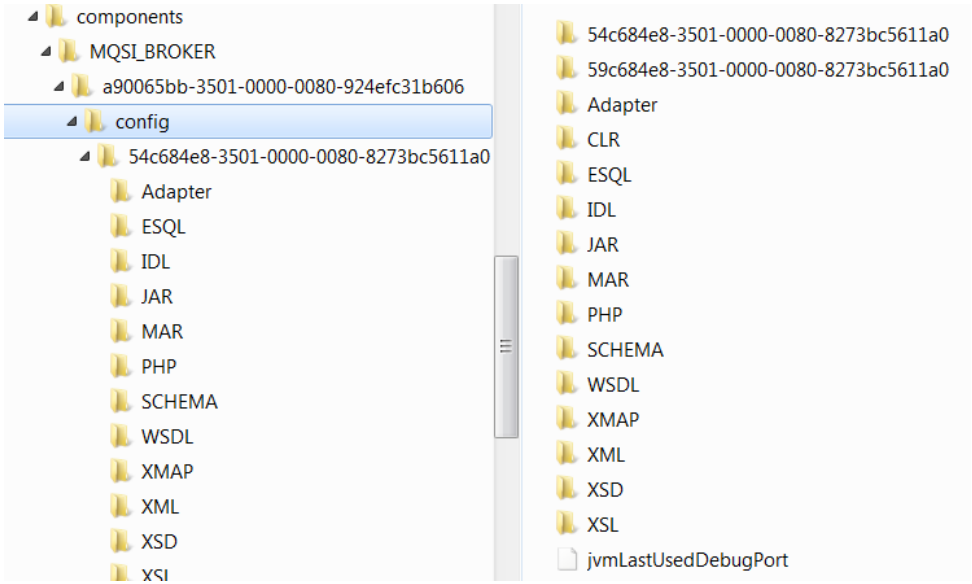


Configuration Storage

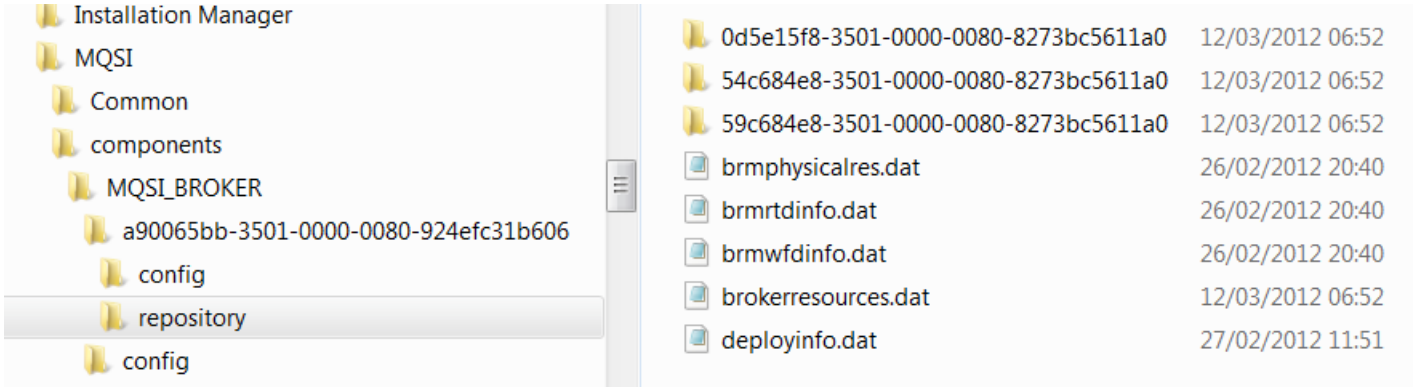
Registry



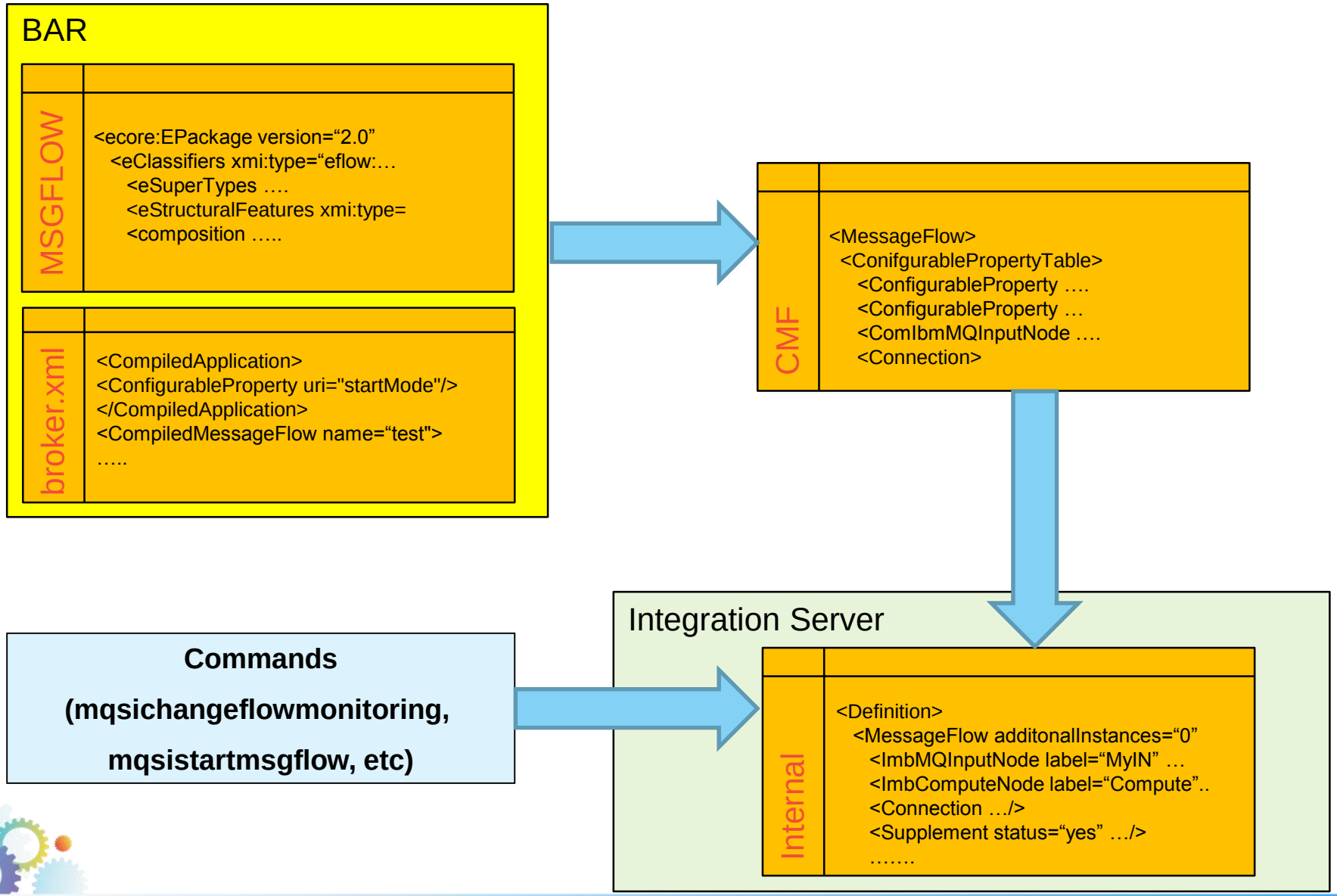
EG resources directory



Config Stores



Flow runs from translated/combined artefacts



Creation/Setup: Usually scripted

```
mqsicreatebroker TESTNODE
mqsicreateconfigurableservice TESTNODE -c EmailServer -o myEmailServer -n .... -v ...
mqsichangeproperties TESTNODE -b httplistener -o HTTPListener -n startListener -v false
mqsicreateexecutiongroup TESTNODE -e default
mqsichangeproperties TESTNODE -e default -o ComIbmJVMManager
   -n jvmMaxHeapSize -v 1048576000
mqsichangeproperties TESTNODE -e default -o ExecutionGroup
   -n httpNodesUseEmbeddedListener -v true
mqsichangeproperties TESTNODE -e default -o HTTPConnector
   -n explicitlySetPortNumber -v 8085
mqsistopmsgflow TESTNODE -e default
mqsistartmsgflow TESTNODE -e default
mqsideploy TESTNODE -e default -a solutionBAR1.bar -w 500
mqsideploy TESTNODE -e default -a solutionBAR2.bar -w 180
mqsideploy TESTNODE -e default -a solutionBAR3.bar -w 250
```

Common observations

- Extremely capable, industrial-strength infrastructure. But:
  - Overhead is more costly than desired.
  - Set-up is more complex than desired.
  - Development/Test environments quite large
  - Current process centred around production environments

- Container/Cloud-based systems have different requirements
  - Ideally would run just the DataFlowEngine

Standalone Integration Servers

Standalone Integration Servers (SIS)

- Run direct from the command line
  - Similar to StrongLoop, Mongo, etc
  - No create step.
  - No deploy step necessary
  - Process is not owned by any other process (or Integration Node)
    - Can be managed by container-based admin (Kubernetes, etc)

- Basic parameters for frequently used settings:
  - Can be given a name under which it runs (should be unique)
  - Default MQ queue manager name
  - http port for HTTP nodes
  - Named event log file rather than logging to syslog/Event Viewer
  - JVM options so that min/max heap size can be specified etc

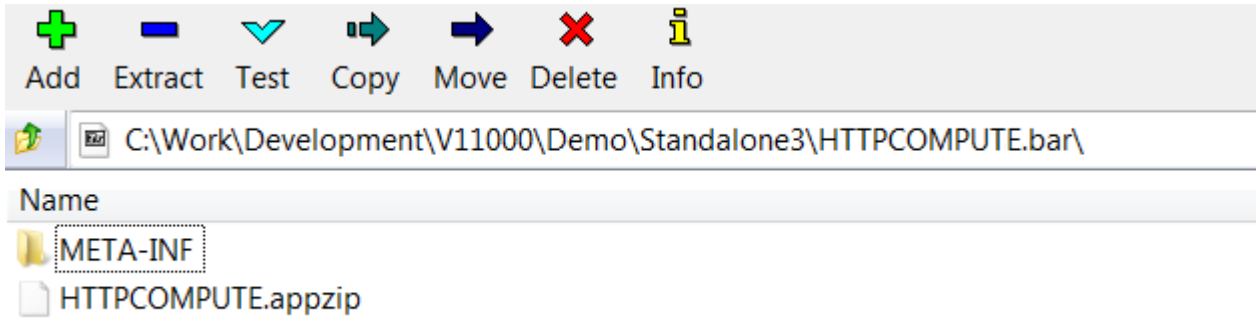
Standalone options

IntegrationServer
--work-directory C:\work\myServer
--event-log C:\work\myServer\syslog.txt
--mq-queue-manager-name MQV9_QM
--http-port-number 7800
--dev-ui-port 4800
--java-{jvm option name) jvmOptionValue
--service-trace
serverLabel

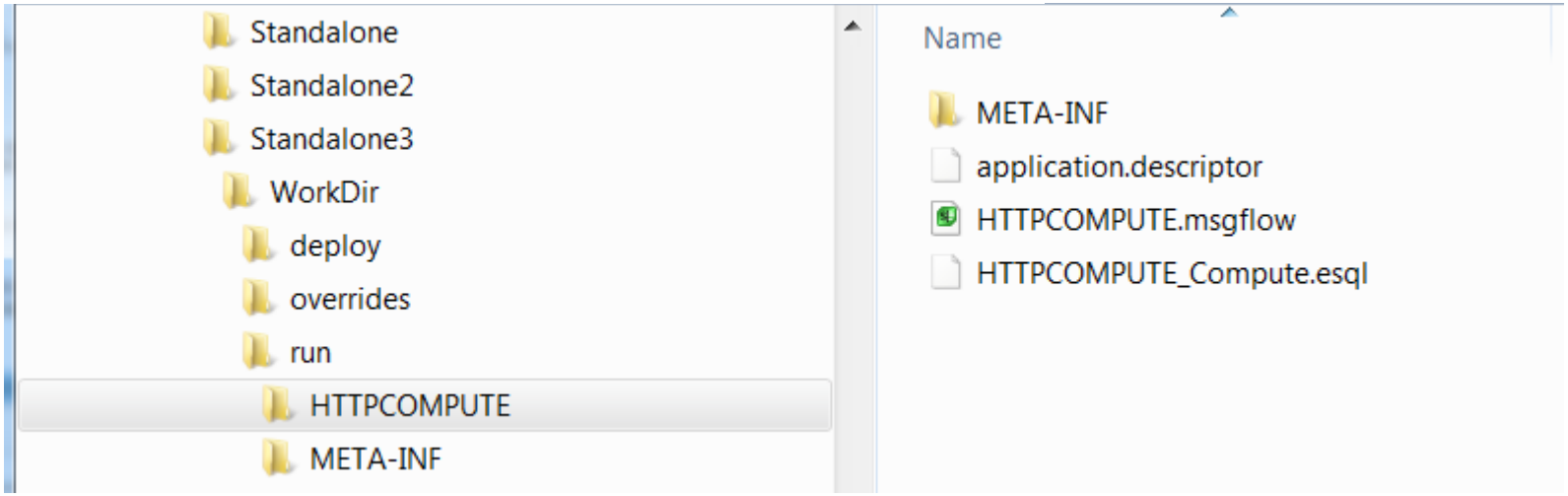
Current options for the Beta

Unzip and Go

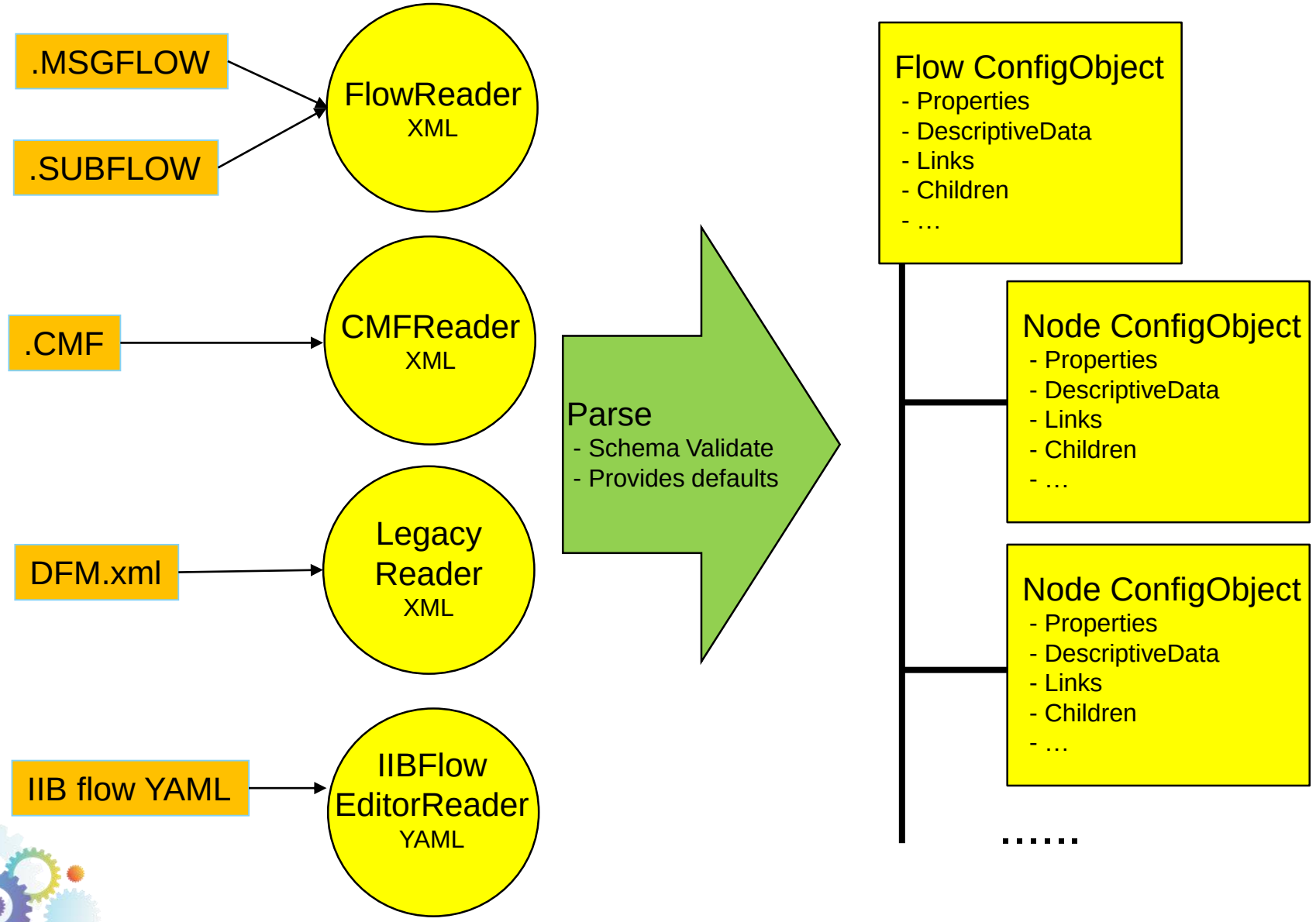
- "run" directory reflects the structure of the BAR files



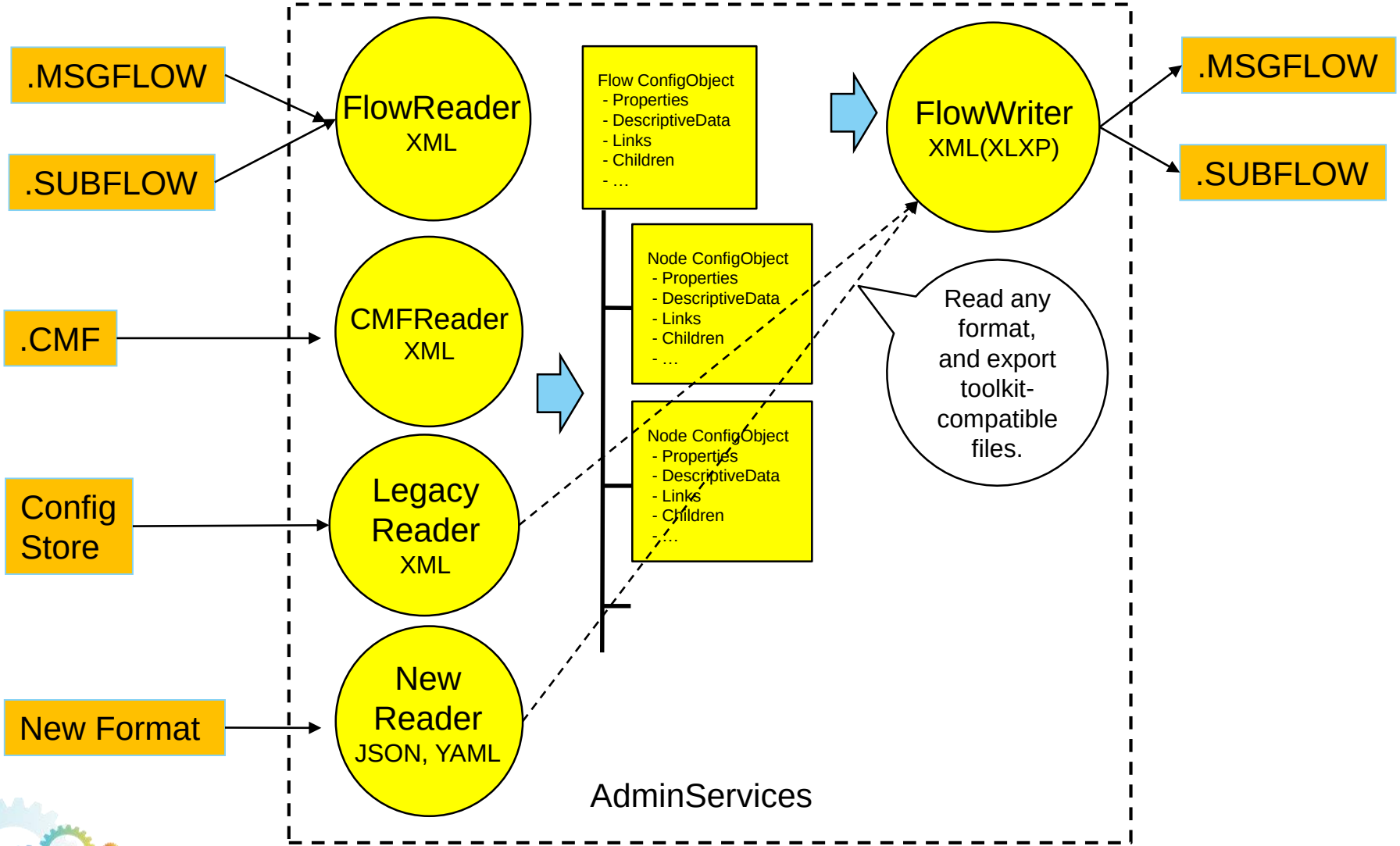
No internal directory structure



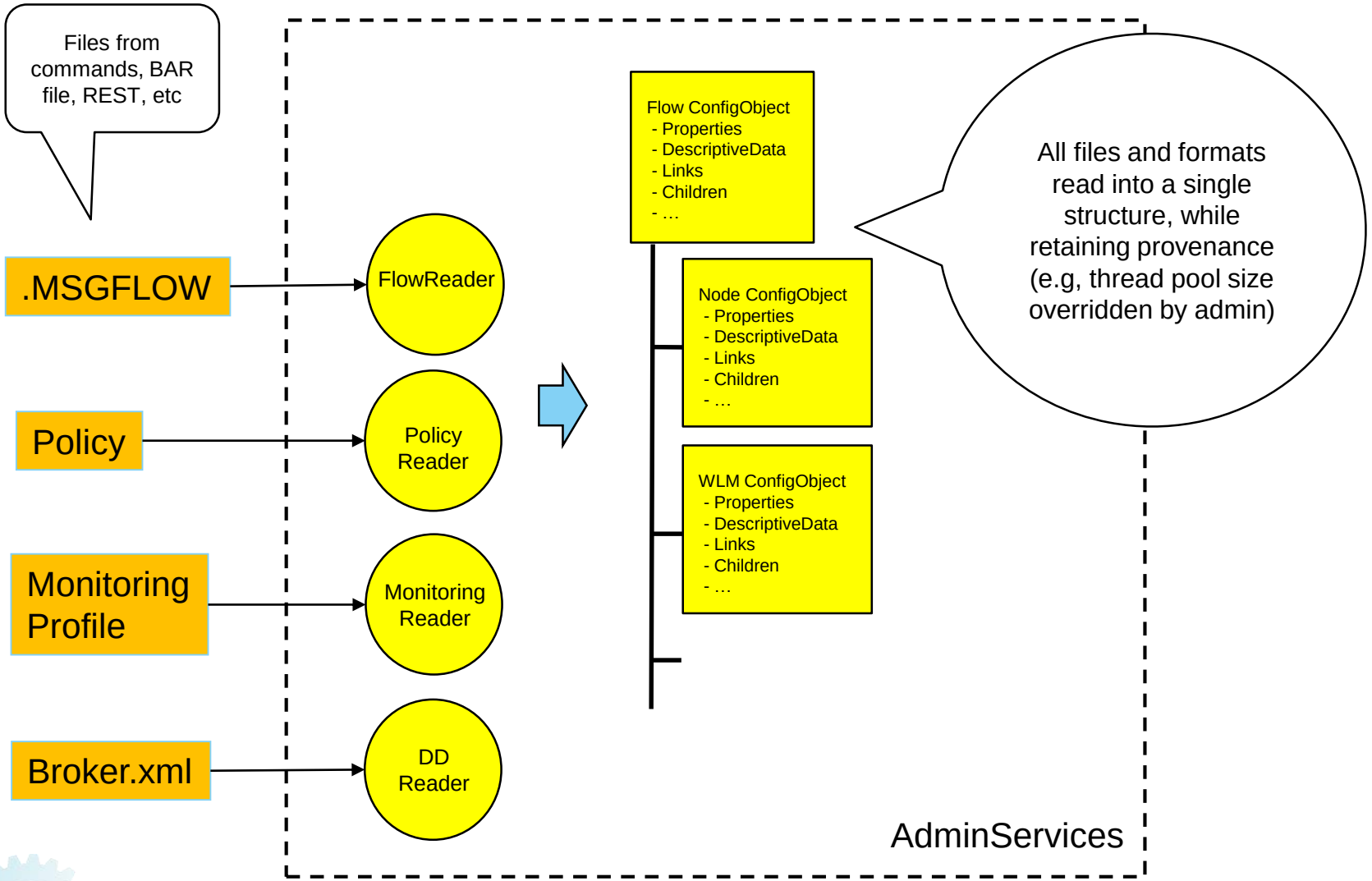
Flow/Subflow readers



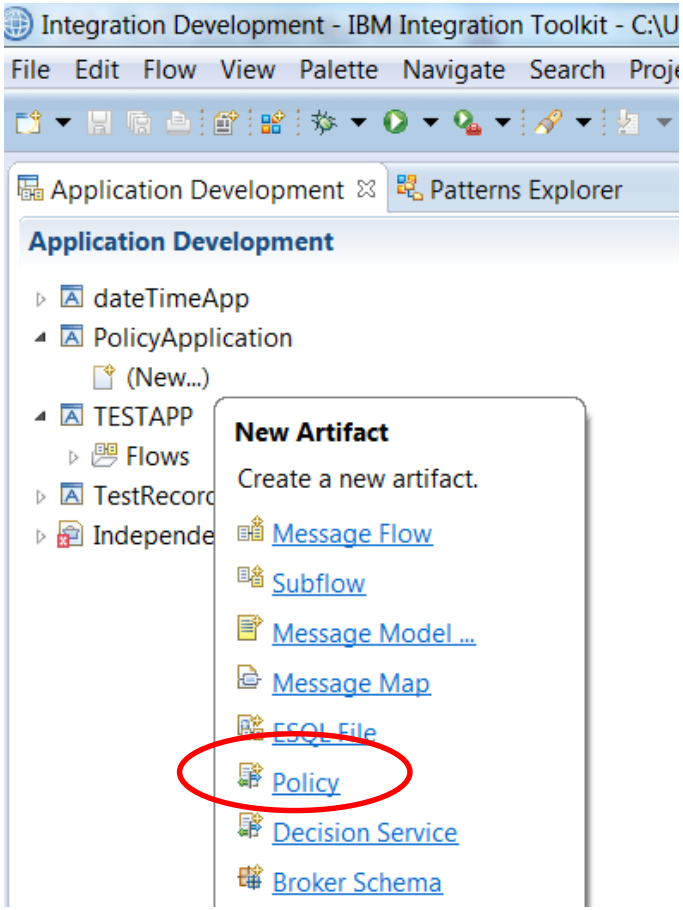
Any file format to any other

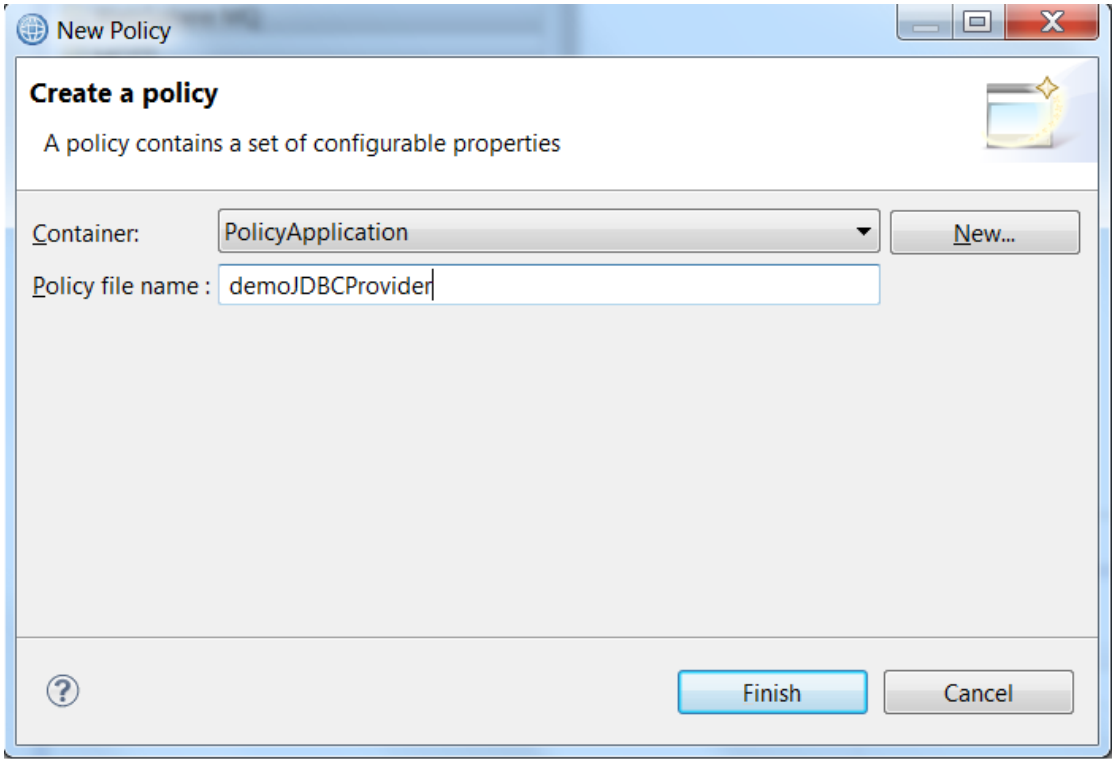


Overrides and deploy descriptor

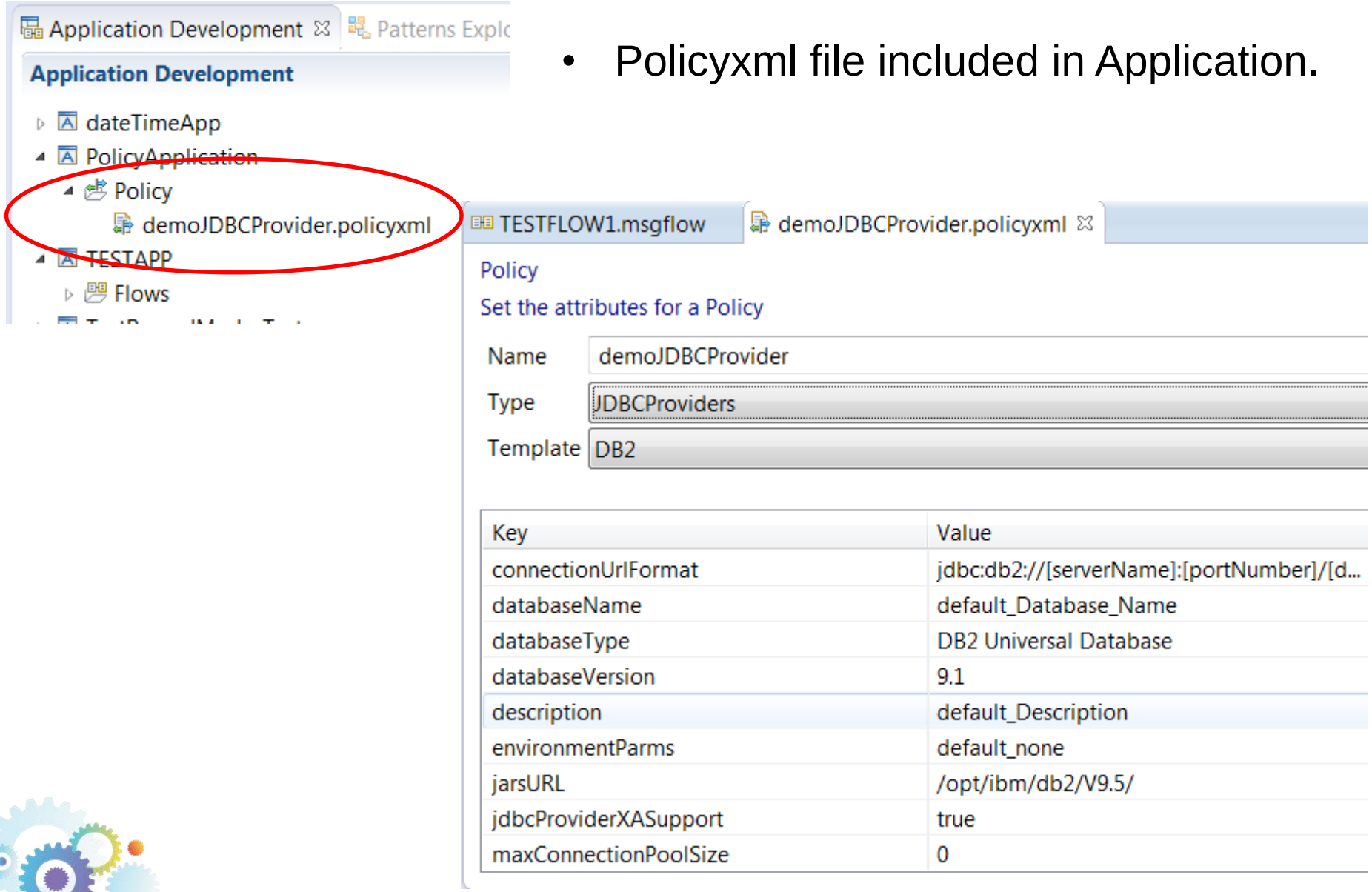


Policy creation: Toolkit (1)



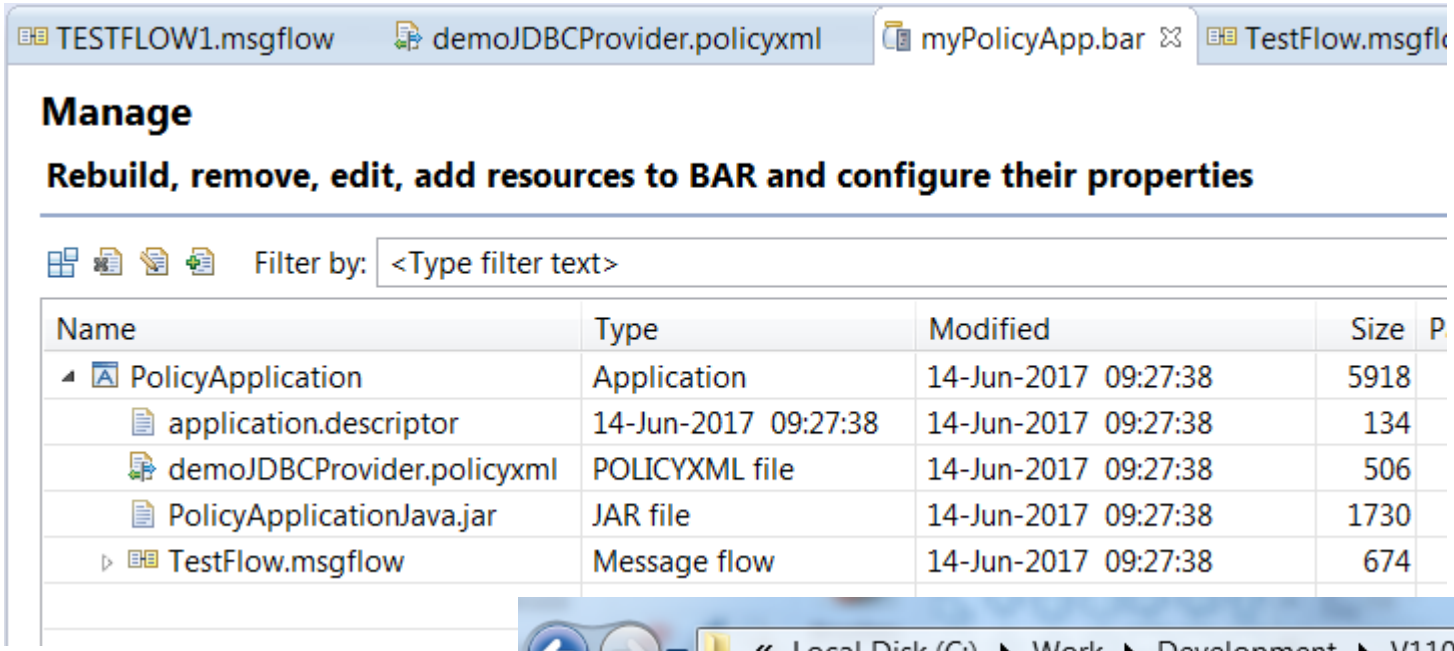


Policy creation: Toolkit (2)

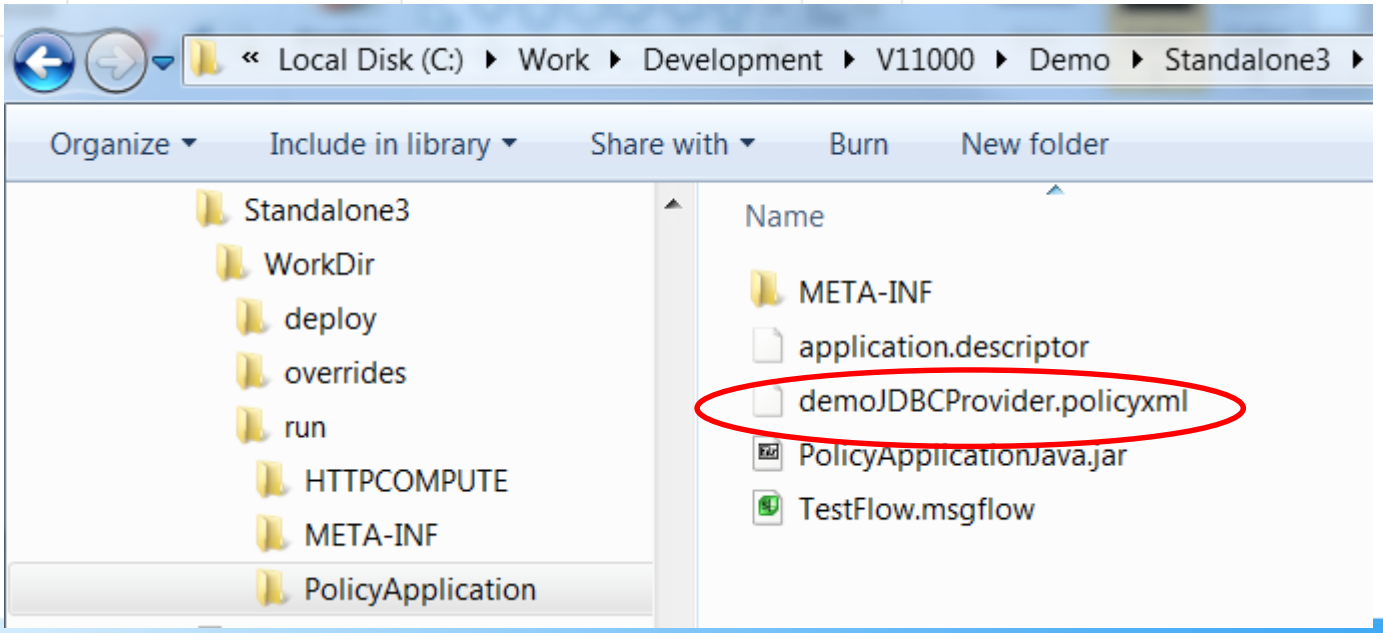


- Policyxml file included in Application.

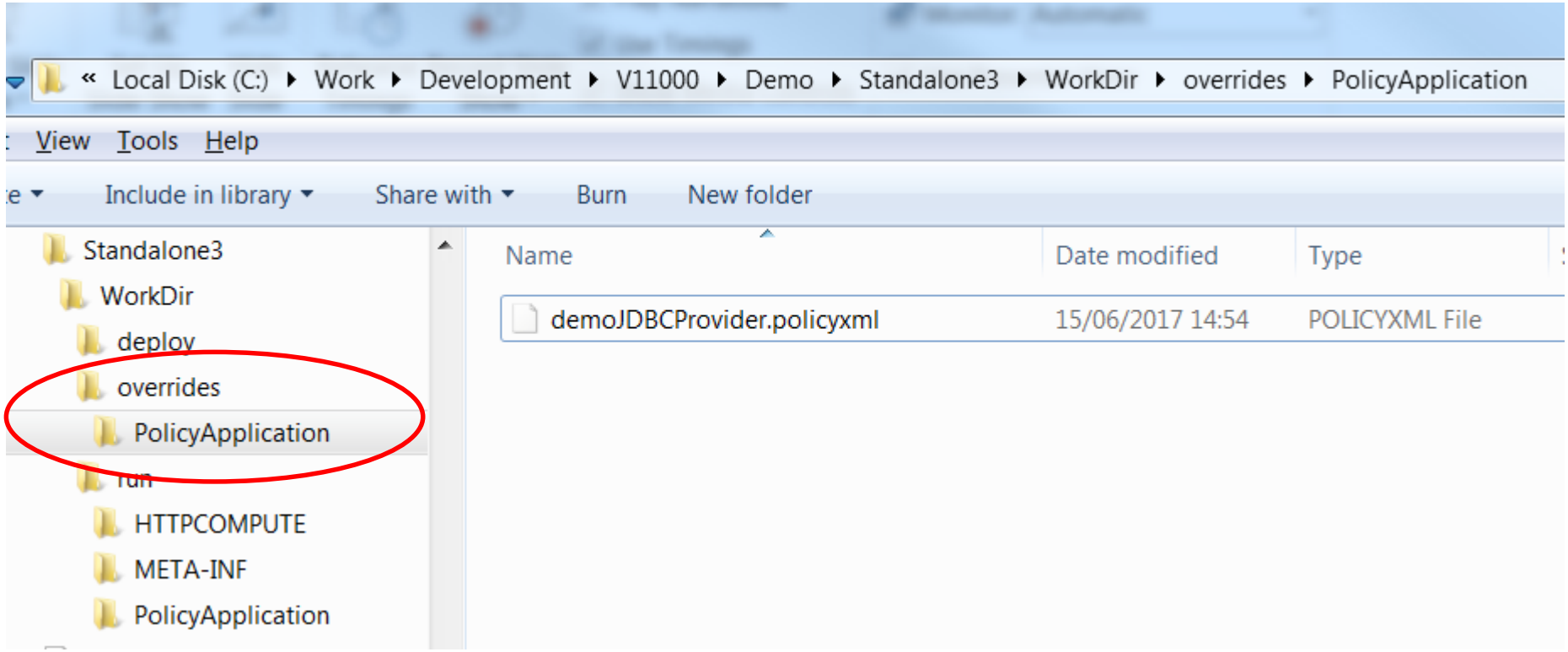
Policy creation: “Unzip and Go”



- SIS can process policyxml files in startup/ overrides directory



Overridden Policy



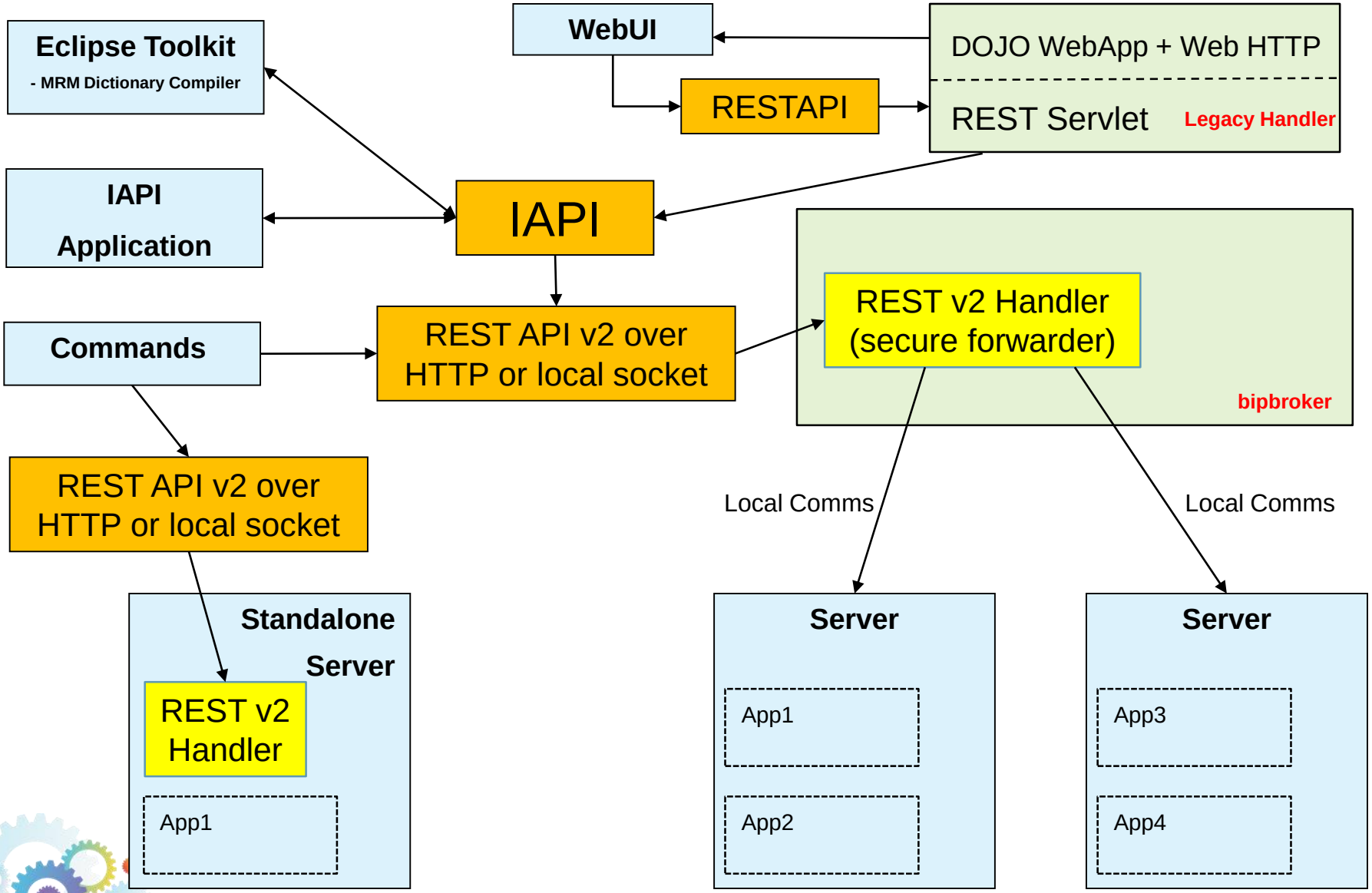
- Standalone servers start with an overrides directory
  - Has the same hierarchy as the source directory.
- Overrides take precedence over the source material
- Updated policy can be placed in the application directory

Engineering

- Common approach for all configuration.
  - Bars, Flows, subflows, policy, overrides etc
- Specific readers parse input documents
  - Do not have to be tied to a specific format
  - Create configuration objects using schema defaults
  - Common validation approach irrespective of format.
- Configuration model provides:
  - Common format for all configuration
  - Common “diffing” approach to determine what has changed
  - Transformation services from one format to another
  - Run-time objects can be sourced from multiple documents

Integration Nodes and servers

Integration Nodes in vNext



Integration Servers

- Internal design shared by all Integration servers
  - Standalone server not a separate codebase
  - Each Integration Server will have a source directory
    - Deployed artefacts will “land” in this directory in the unzipped form

- bipbroker will revert back to being just a:
  - Router for administration requests
    - Communication can still be via local comms rather than over REST
  - Monitor/”Herder” for its Integration servers
  - Manage node level configuration
  - Continue to provide HA functionality.
  - Continue to provide administration security

Updates/Redeploy

- Servers can run off source in an “unzip and go” scenario
  - Source retrieved from a repository
  - Unzipped to a target directory
  - Standalone Integration server is started on that directory

- Servers will support the concept of an update:
  - In the beta, standalone servers use a deploy directory.
  - Going forward this will be a REST request to bipbroker (if using an Integration Node) or the server itself.
    - POST, PUT, PATCH
  - BAR files that add/update existing resources
  - Property level changes similar to existing commands

Differential deploy

- In IIBv10 a redeploy can have a large impact on resources:
  - Applications/Library have all existing contents deleted.
  - Post-deploy overrides are lost.
  - Maps and Schemas are recompiled
  - Flows interrupted for longer than desired.

- Re-engineered server improves this area:
  - Preservation of source structure allows targeted updates
  - Configuration model allows exact changes to be calculated.
  - Schema model allows scope of change to be described

Differential deploy possibilities

- Individual property changes can be made
  - "hot swapped in" if the property allows this.
  - Brief update under lock if needed.
- Individual message flow nodes can be changed
  - Node "re-starts" with a new configuration
- Flow level changes
  - Only the individual flow that is affected will be rebuilt.
- Application/Library level changes
  - Only affected resources are updated and changed
  - No "tear down" of all existing contents
- Post-deploy overrides are not lost
  - Eg, monitoring, statistics, policy attachments etc

Pre-compiled resources

- Maps and schemas are compiled on deploy in IIBv10
  - Time-consuming for large numbers of maps/schemas
- Compilation can now take place independently…

```
mqsipackagebar
  -a SIS_App_Shlib_WithPreComp.bar
  -w C:\devel\SIS_Scratch -k MapAndSchemaInShlib_App
  -y MapAndSchema_Shlib -i
```

Beta: -i used for compilation

Command output – Schema compilation

Generating runtime objects for '[MapAndSchemaInShlib_App]' in 'C:\devel\SIS_Scratch' ...

Shared Lib MapAndSchema_Shlib

Shared Library MapAndSchema_Shlib contains maps: [C:\devel\SIS_Scratch\MapAndSchema_Shlib\MapJson2CsvInShlib.map]

Shared Library MapAndSchema_Shlib contains schemas: [C:\devel\SIS_Scratch\MapAndSchema_Shlib\csvWithHdr.xsd, C:\devel\SIS_Scratch\MapAndSchema_Shlib\IBMdefined\CommaSeparatedFormat.xsd, C:\devel\SIS_Scratch\MapAndSchema_Shlib\shlibXml.xsd]

App MapAndSchemaInShlib_App

App MapAndSchemaInShlib_App references other library MapAndSchema_Shlib

Have 1 schema files to compile

Wrote XLXP BIR file: C:\devel\SIS_Scratch\MapAndSchemaInShlib_App\$mqsiApplication.bir

Information: No .xsd with DFDL annotations found in input, will not create a .dpif

Have 3 schema files to compile

Wrote XLXP BIR file: C:\devel\SIS_Scratch\MapAndSchema_Shlib\$mqsiLibrary.bir

Wrote DFDL PIF file: C:\devel\SIS_Scratch\MapAndSchema_Shlib\$mqsiLibrary.dpif

Command output – Map compilation

Generating map: C:\devel\SIS_Scratch\MapAndSchemaInShlib_App\AppMapShlibDfdl2xml.map

Generating map: C:\devel\SIS_Scratch\MapAndSchema_Shlib\MapJson2CsvInShlib.map

Generated, now packaging BAR

Packaging content from 'C:\devel\SIS_Scratch ...

Successfully added file '$mqsiApplication.bir' to the BAR file.

…..

Successfully added file 'xmap_default__AppMapShlibDfdl2xml.ser' to the BAR file.

Successfully added file 'xmap_default__AppMapShlibDfdl2xmlcaf7ff1a14a31266.class' to the BAR file.

Successfully added file 'xmap_default__AppMapShlibDfdl2xmlcaf7ff1a14a31266_Common$ConvertToXCIState.class' to the

Successfully added file 'xmap_default__AppMapShlibDfdl2xmlcaf7ff1a14a31266_Common$InitParam.class' to the BAR file.

Successfully added file 'xmap_default__AppMapShlibDfdl2xmlcaf7ff1a14a31266_Common$KeyTable.class' to the BAR file.

Successfully added file 'xmap_default__AppMapShlibDfdl2xmlcaf7ff1a14a31266_Common$NodeKind.class' to the BAR file.

Successfully added file 'xmap_default__AppMapShlibDfdl2xmlcaf7ff1a14a31266_Common$subText.class' to the BAR file.

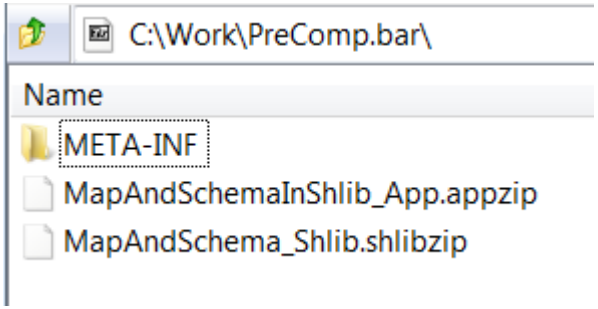
Successfully added file 'xmap_default__AppMapShlibDfdl2xmlcaf7ff1a14a31266_Common$TunnelParam.class' to the BAR file.

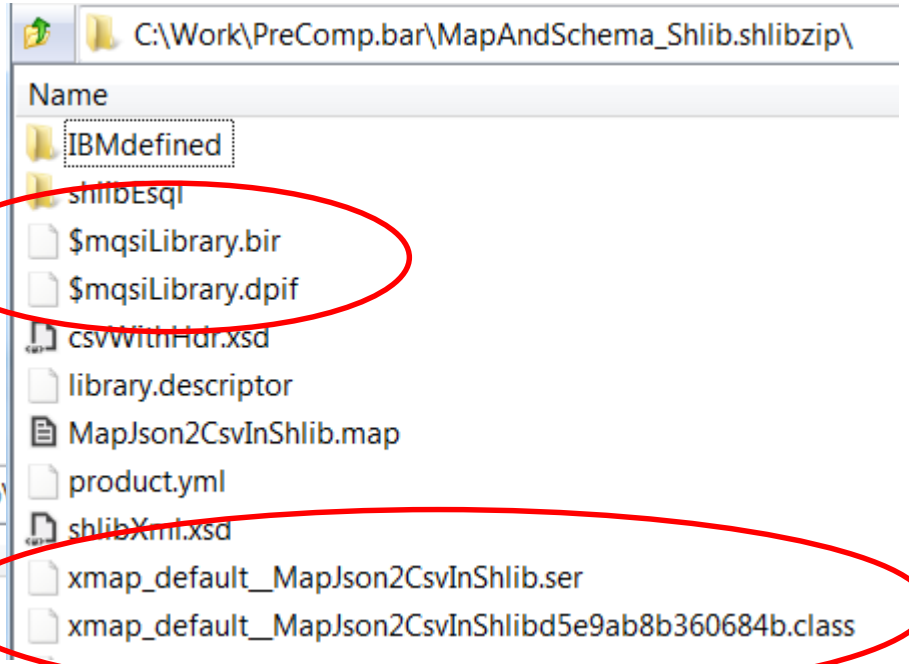
Successfully added file 'xmap_default__AppMapShlibDfdl2xmlcaf7ff1a14a31266_Common.class' to the BAR file.

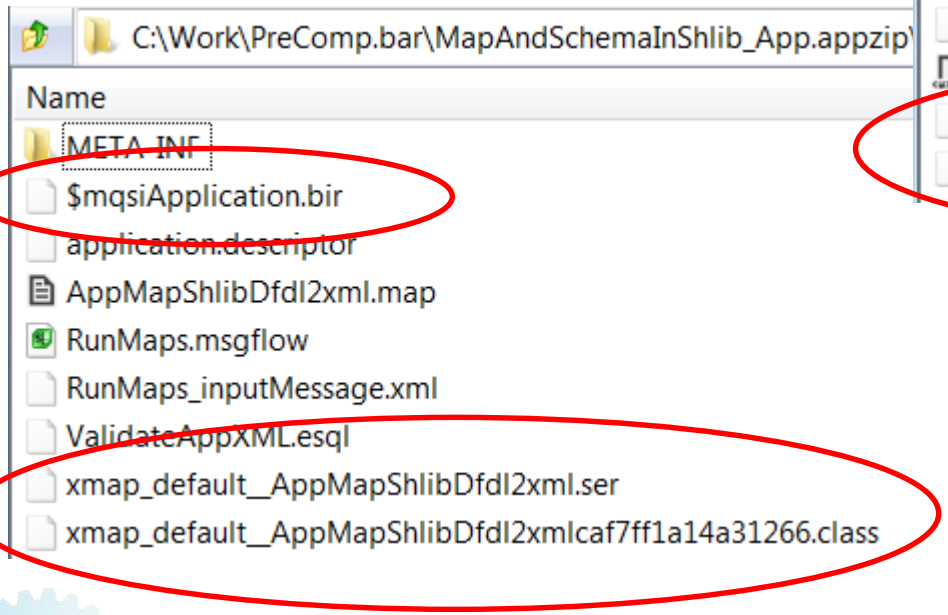
Successfully added file 'xmap_default__AppMapShlibDfdl2xmlcaf7ff1a14a31266_Common_Partition0.class' to the BAR file.

Successfully added file 'xmap_default__AppMapShlibDfdl2xmlcaf7ff1a14a31266_Common_Partition1.class' to the BAR file.

Command output: The BAR







- Compiled resources unzipped
- No compilation on start-up
- Server runs off them
- Included in differential deploy

Future directions post-Beta

What's coming up?

- One "work-path" directory for a standalone integration server.
  - Source and overrides sub-directories (no deploy)
  - Log directory for traces and other diagnostics.
- Advanced configuration:
  - Configuration/policy files in the start-up/overrides directory
  - Fully replace configurable services.
- REST API ("/apiv2")
  - Will be able to present "live" information from the process
  - Current /apiv1 is limited to configuration information only
- Separable map/schema compilation
  - Enable in toolkit and other externals

Other possibilities

- Formal separation of deploy/start
  - Resources can be “deployed” without trying to start them
    - Deploy will succeed even if dependencies are missing
  - Start with validate the dependency chain
    - If valid the resources will be started

- Impact analysis
  - Report resources that are linked to each other
  - Report artefacts that are currently in use
  - “Pre-deploy” step to show what will be impacted by changes

And we haven't forgotten …

- Standalone servers and:
  - Global cache
  - Administration security
  - Modes of operation
  - HA scenarios
  - Existing administration WebUI
- Existing Integration/REST API and command usage
- Migration from previous versions
  - Support for server-level resources
  - MessageSets, Adapters in Shared Libraries

Thank you and Questions?