



## Who We Are

- Kennedy Space Center, Florida
- Talents
  - Engineers
  - IT
  - Software Development
- Our Job
  - Administer
  - Improve/Automate processes
- Not our Job
  - Server Side

## WHAT ARE BUSINESS RULES?

- **Persistable Windchill objects**
  - Set
  - Rule
  - Link
- **Control the quality of data**
  - Don't let improperly configured data through.
- **Reduce the time to complete tasks**
  - Does the validation before the checker/approver even gets the task.
  - Can automatically reroute if there is a fail.
- **Customizable to meet specific needs**
  - Check for attributes, state of the object or even states of dependent objects.

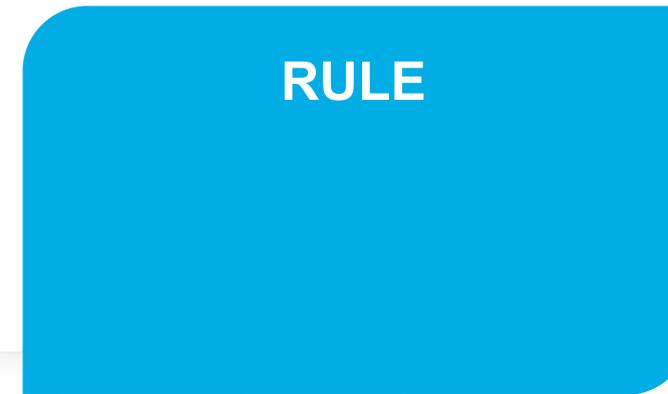
## BUSINESS RULE OBJECTS

- **Sets**

**SET**

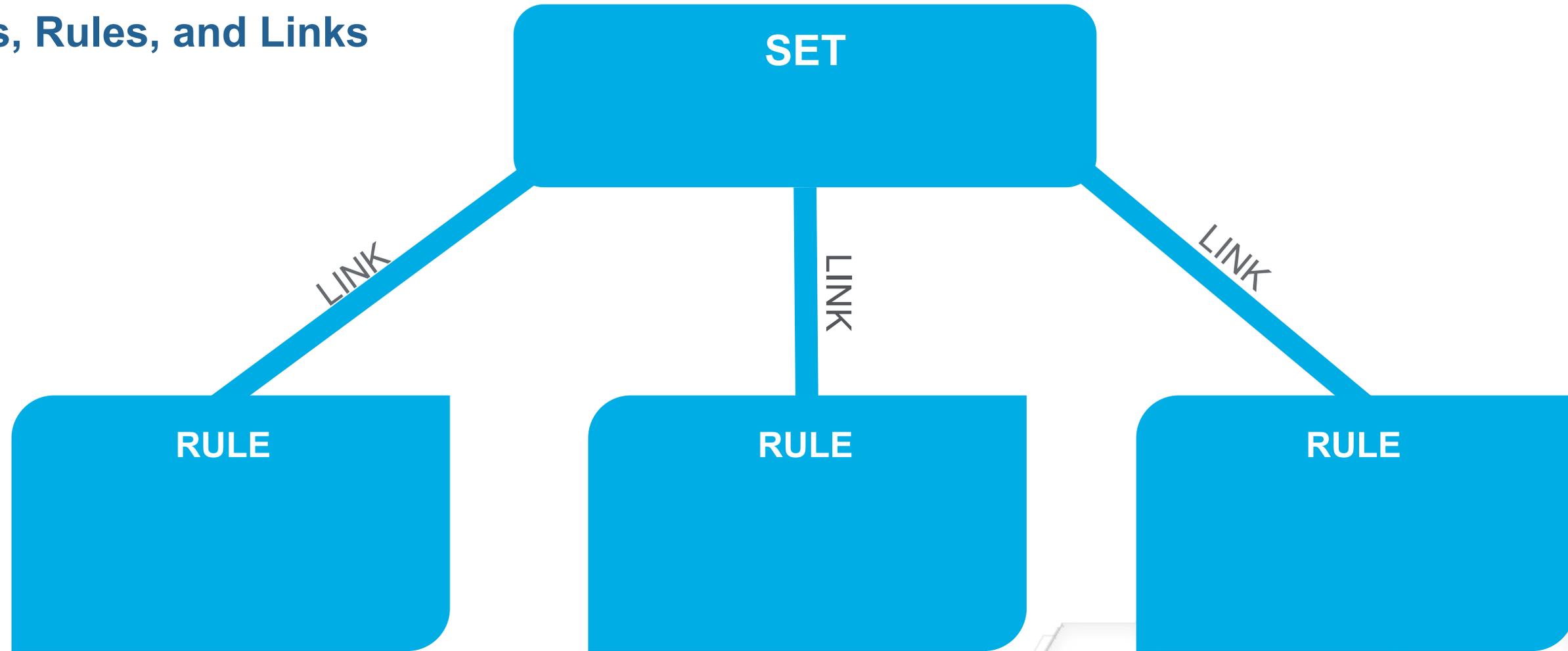
## BUSINESS RULE OBJECTS

- **Sets, Rules**



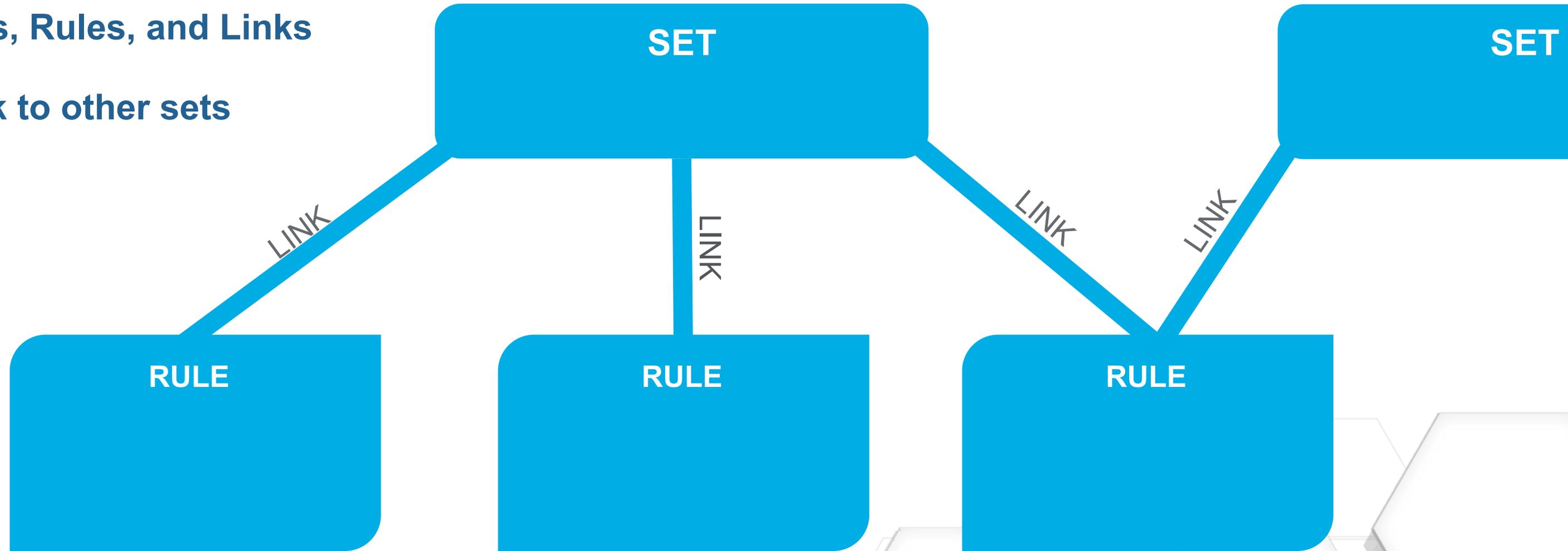
## BUSINESS RULE OBJECTS

- **Sets, Rules, and Links**



## BUSINESS RULE OBJECTS

- **Sets, Rules, and Links**
- **Link to other sets**



## BUSINESS RULE OBJECTS

Business Rule Selector	Rule Validation “com.ptc.core.businessRules.validation”	Description
<b>CHECKOUT_RULE</b>	CheckoutRuleValidator	Validates that objects are not checked out.
<b>RELEASE_TARGET</b>	ReleaseTargetValidator	Ensures that all “Resulting Objects” are at an appropriate state for release and have an appropriate change management transition specified that is consistent with the assigned lifecycle transition rules.
<b>ATTRIBUTE_RULE</b>	AttributeRuleValidator	Validates that the specified attribute rule configuration for an object type is valid.
<b>BOM_RELEASE_RULE</b>	BOMReleaseRuleValidator	Ensures that all resulting objects are at an appropriate state and all their first level children are at an appropriate state.

## CREATING BUSINESS RULES (Traditional Approach)

- **XML files**
  - Set.xml
  - Rule.xml \*
  - Link.xml \*
  - LoadFile.xml
- **Zip the business rule objects.**
  - The set, rule and link files
- **Call out the LoadFile.xml**
  - Use the LoadFromFile command in a Windchill shell

## CREATING BUSINESS RULES (Traditional Approach)

- **XML Tips**

- Must follow standardX20.dtd
  - <Windchill>codebase\registry\ixb\dtds\standardX20.dtd\businessRules.dtd
  - Defines the elements and the structure of the XML document

- Check your spelling!

`</BuisnessRuleLink>` → `</BusinessRuleLink>`

`<localID>` → `<localId>`

- White space is preserved

`<key>`  
`ACME_PART_ATTRIBUTE_RULE`  
`</key>` → `<key>ACME_PART_ATTRIBUTE_RULE</key>`

## EXAMPLES ATTRIBUTES

- **Requirements**

- WTPart number must begin with an 'A'
- WTPart cage code must be from the set
  - [ACM01,ACM02,ACM03,ACM04]

- **To Do**

- Create set.xml file
- Create rule.xml file
- Create link.xml file
- Create load.xml file
- Execute load from file command

## CREATING BUSINESS RULES

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE BusinessRuleSet SYSTEM "standardX20.dtd">
<BusinessRuleSet>
  <ObjectID>
    <localId>wt.businessRules.BusinessRuleSet:00001</localId>
  </ObjectID>
  <objectContainerPath>/wt.inf.container.OrgContainer=ACME</objectContainerPath>
  <key>ACME_PRE_RELEASE II</key>
  <name>ACME_ReleaseRuleSet</name>
  <description>To test basic Attribute RuleSet Validation</description>
  <enabled>true</enabled>
  <overridable>true</overridable>
  <updateIfExists>true</updateIfExists>
</BusinessRuleSet>
```

## SET (wt.businessRules.BusinessRuleSet)

- Identification
  - OID
  - Key
  - Name
- Where
  - Container Path
- Other
  - Description
  - Enabled
  - Overridable

## CREATING BUSINESS RULES

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE BusinessRule SYSTEM "standardX20.dtd">
<BusinessRule>
  <ObjectID><localId>wt.businessRules.BusinessRule:000001</localId></ObjectID>
  <objectContainerPath>/wt.inf.container.OrgContainer=ACME</objectContainerPath>
  <key>ACME_PART_ATTRIBUTE_RULE</key>
  <selector>ATTRIBUTE_RULE</selector>
  <name>ACME Number Rule</name>
  <description>Number must always begin with an 'A'</description>
  <enabled>true</enabled>
  <updateIfExists>true</updateIfExists>
  <configs>
    <config name="objectType" value="wt.part.WTPart"></config>
    <config name="CAGE_CODE" value="[ACM01,ACM02,ACM03,ACM04]"></config>
    <config name="number" value="BEGINSWITH(A)"></config>
  </configs>
</BusinessRule>
```

## RULE (wt.businessRules.BusinessRule)

- Configs
  - Name-Value pair
  - Name is the internal name

## CREATING BUSINESS RULES

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE BusinessRuleLink SYSTEM "standardX20.dtd">
<BusinessRuleLink>
  <ObjectID>
    <localId>wt.businessRules.BusinessRuleLink:000001</localId>
  </ObjectID>
  <ruleSet>
    <ObjectReference>
      <localId>wt.businessRules.BusinessRuleSet:000001</localId>
    </ObjectReference>
  </ruleSet>
  <rule>
    <ObjectReference>
      <localId>wt.businessRules.BusinessRule:000001</localId>
    </ObjectReference>
  </rule>
  <blockNumber>1</blockNumber>
  <updateIfExists>true</updateIfExists>
</BusinessRuleLink>
```

## LINK (wt.businessRules.BusinessRuleLink)

- Reference Set
- Reference Rule
- State block number

## LOADING BUSINESS RULES

### LoadRules.xml

- Call this file from a Windchill shell
- If any of the xml files are not formatted correctly, an error will be thrown and nothing will be imported\*

```
<?xml version="1.0" encoding="UTF-8"?>  
<!DOCTYPE NmLoader SYSTEM "standardX20.dtd">  
  
<NmLoader>  
  <csvExecuteImport handler="wt.Load.LoadImport.executeImport">  
    <csvimportFilename>loadFiles/ixbImport/Examples/One/RuleConfiguration_One.zip  
    </csvimportFilename>  
  </csvExecuteImport>  
</NmLoader>
```

```
windchill wt.load.LoadFromFile -d <Windchill>\pathTo\LoadRules.xml
```

## LOADING BUSINESS RULES

### Windchill Shell Output

- All objects were imported successfully.
- Check method server output for successful completion of all loads.

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### Method Server Log Output

- Unable to create a BusinessRuleLink object without both a ruleSet and a rule
- All objects were imported successfully

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Key ↑	Name	Context	Enabled	Overrid...	Ord...	Description
ACME_PRE_RELEASE	ACME_ReleaseRuleSet	Rocket	Yes	Yes		To test basic Attribute RuleSet Validation
⊕ CHANGEABLE_PRE_RELEASE	Change Pre-Release Validation	Site	Yes	Yes		Business Rule Set used before objects are released as part of

## LOADING BUSINESS RULES

### Windchill Shell Output

- All objects were imported successfully.
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### Method Server Log Output

- Unable to create a BusinessRuleLink object without both a ruleSet and a rule
- All objects were imported successfully

*That doesn't look right!*

Key ↑	Name	Context	Enabled	Overrid...	Ord...	Description
ACME_PRE_RELEASE	ACME_ReleaseRuleSet	Rocket	Yes	Yes		To test basic Attribute RuleSet Validation
CHANGEABLE_PRE_RELEASE	Change Pre-Release Validation	Site	Yes	Yes		Business Rule Set used before objects are released as part of

## LOADING BUSINESS RULES

### Windchill Shell Output

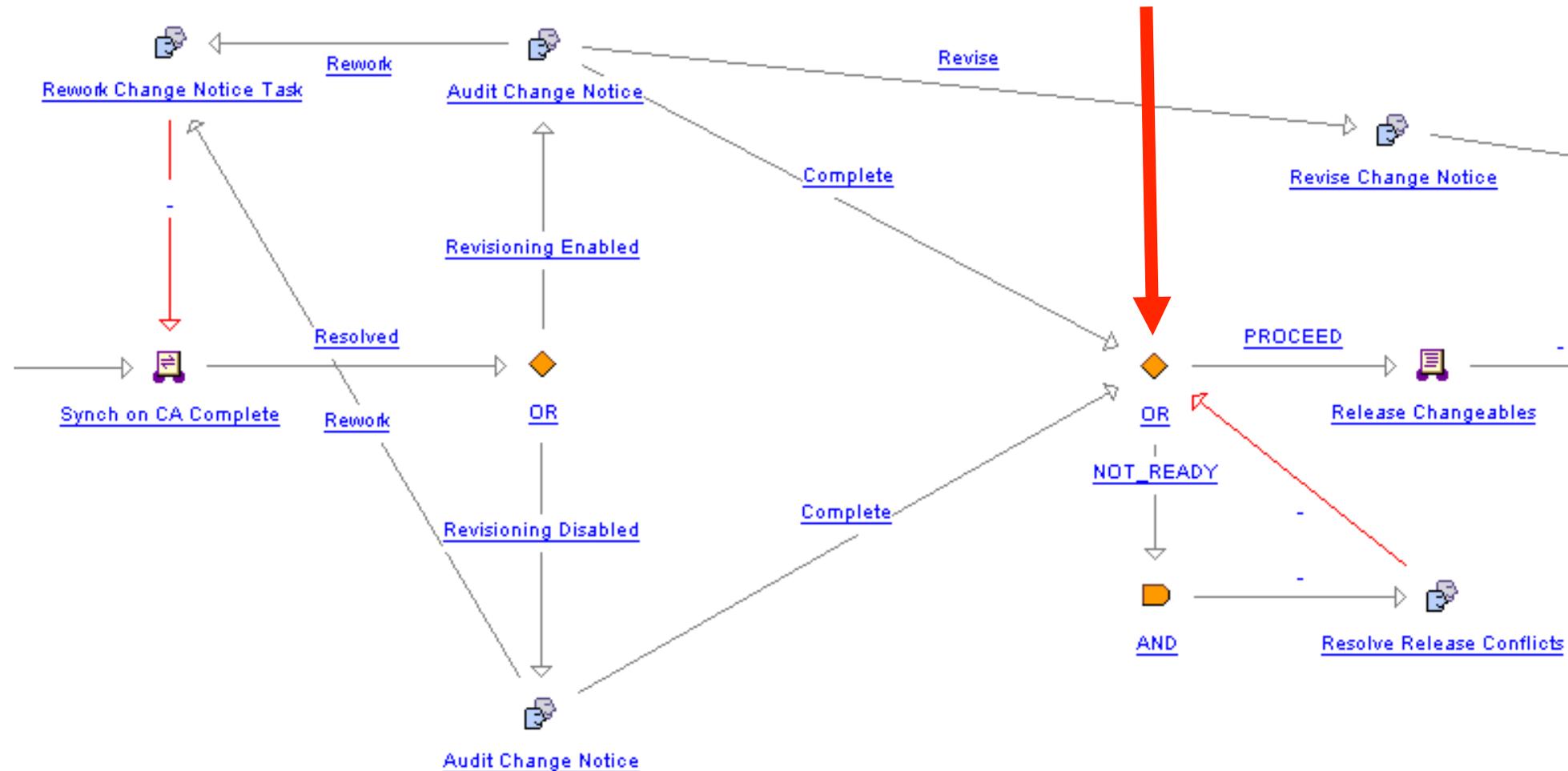
- All objects were imported successfully.
- Check method server output for successful completion of all loads.

Key ↑	Name	Context	Enabled	Overrid...	Ord...	Description
<del>ACME_PRE_RELEASE</del>	<del>ACME_ReleaseRuleSet</del>	<del>Rocket</del>	<del>Yes</del>	<del>Yes</del>		<del>To test basic Attribute RuleSet Validation</del>
ACME_PRE_RELEASE_II	ACME_ReleaseRuleSet	ACME	Yes	Yes		To test basic Attribute RuleSet Validation
ACME_PART_ATTRIBUTE_RULE	ACME Number Rule	ACME	Yes		1	Number must always begin with an 'A'
CHANGEABLE_PRE_RELEASE	Change Pre-Release Validation	Site	Yes	Yes		Business Rule Set used before objects are released as part of

## Configure Workflow

### Default Change Notice Workflow

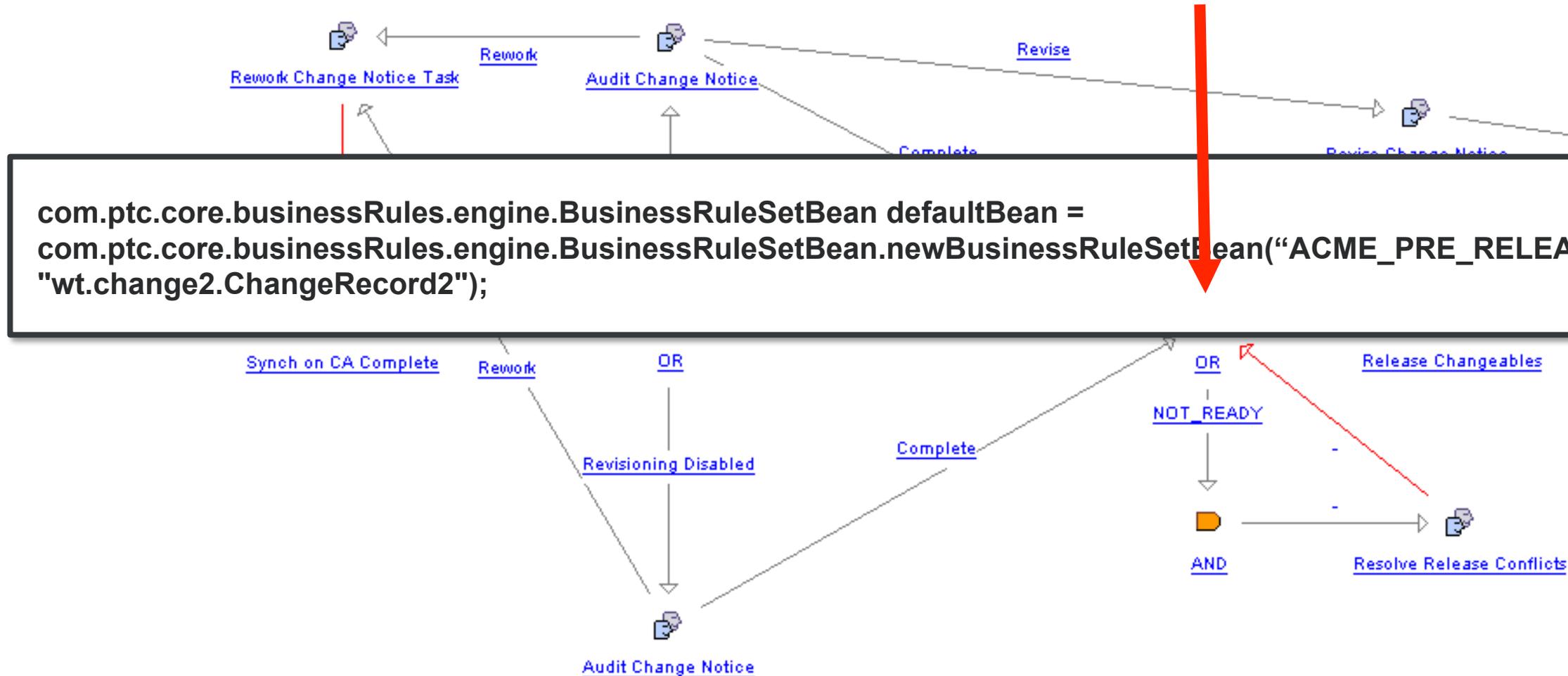
- Edit Change Notice Workflow
  - Edit conditional in Resolve Conflicts loop.



## Configure Workflow

### Default Change Notice Workflow

- Change name of set to the newly created set



Configure Workflow

## Release Part

**Product:** Rocket  
**Type:** Part  
**Number:** B00001  
**Name:** ACME X1 Rocket  
**Version:** A.4 (Design)

**Attributes**

\* **Assembly Mode:** Separable ▼

\* **Source:** Make ▼

**Cage Code:** ACM-0

**Design Authority:**

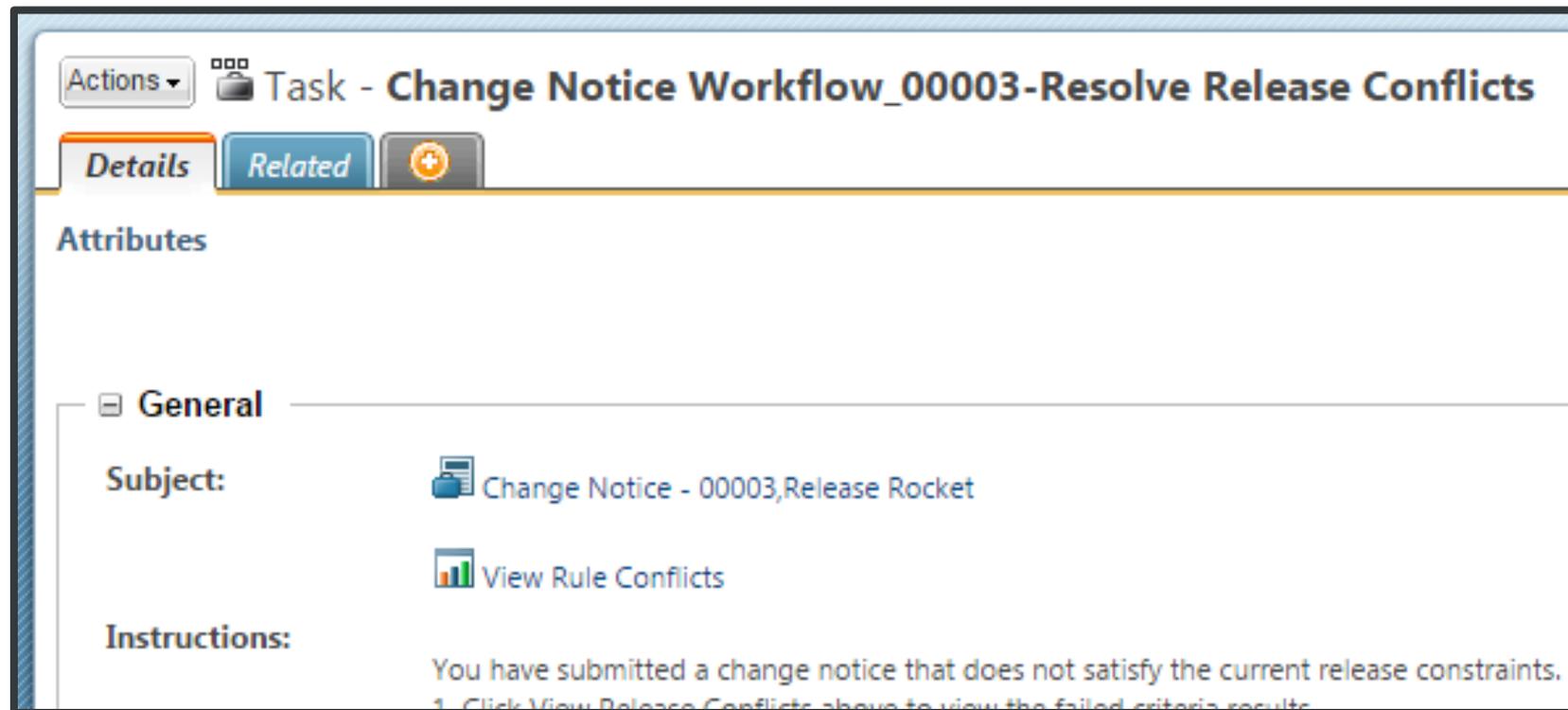
**ITAR Controlled:**  Undefined  
 Yes  
 No

**Weight:**  kg

## Configure Workflow

### Resolve Release Conflicts task

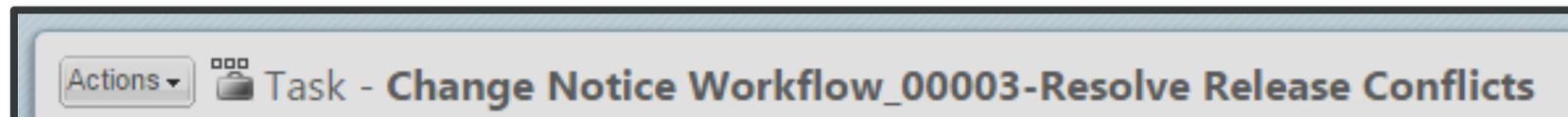
- Click on View Rule Conflicts



## Configure Workflow

### Resolve Release Conflicts task

- Click on View Rule Conflicts
- View conflicts



**View Rule Conflicts**

Rule Conflicts Group by Rule ( 2 objects )

Actions Find in tree

Rule Name	Identity ↑	Conflicts
ACME Number Rule (1)		
	B00001, ACME X1 Rocket, A.4 (Design)	<b>i</b> Error : Cage Code is not in the discrete set [ACM01, ACM02, ACM03, ACM04]. Error : Number does not start with A.

You have submitted a change notice that does not satisfy the current release constraints.  
1. Click View Release Conflicts above to view the failed criteria results.

## CREATING BUSINESS RULES – (Custom Approach)

- **No more XML files**
  - No longer have to be familiar with XML syntax
  - Cuts down on human error
  - Saves time
- **No more local actions**
  - Some administrators do not have access
- **Windchill API**
  - Utility Class
    - Query, Create, Modify and Delete
  - JSP Web based GUI
    - Fast
    - Instant gratification

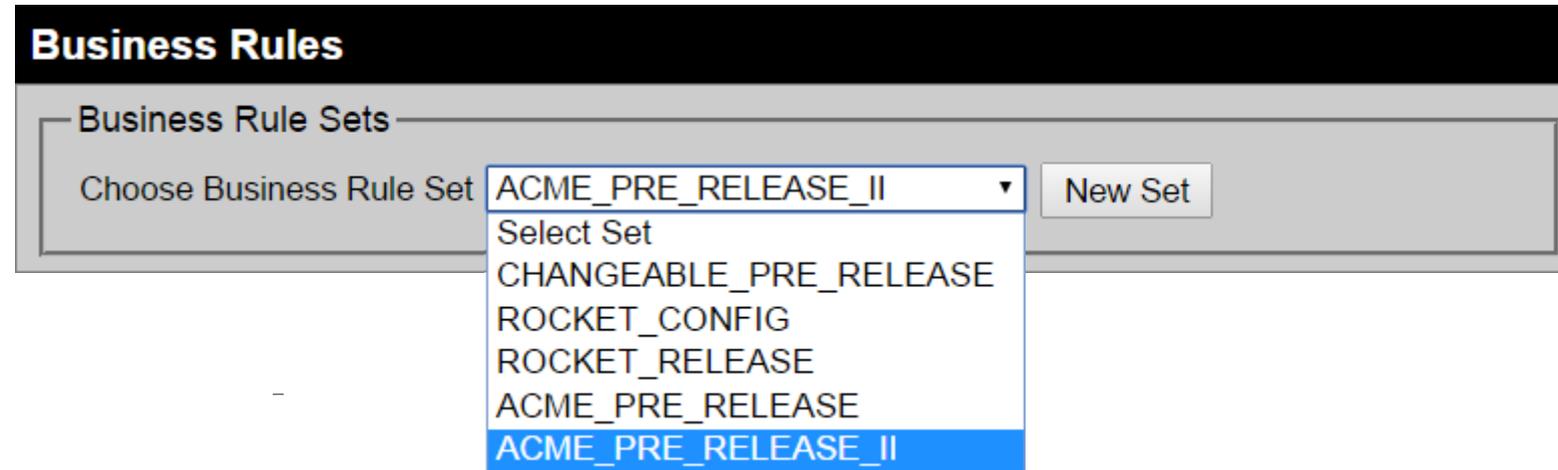
## CREATING BUSINESS RULES – (Custom Approach)

**Business Rules**

Business Rule Sets

Choose Business Rule Set

## CREATING BUSINESS RULES – (Custom Approach)



## CREATING BUSINESS RULES – (Custom Approach)

### Business Rules

Business Rule Sets

Choose Business Rule Set

---

**SET**

**ID:** ACME\_PRE\_RELEASE\_II  
**NAME:** ACME\_ReleaseRuleSet  
**DESCRIPTION:** To test basic Attribute RuleSet Validation  
**CONTEXT:** ACME  
**ENABLED** true  
**OVERRIDABLE** true

---

**RULE**

**ID:** ACME\_PART\_ATTRIBUTE\_RULE  
**NAME:** ACME Number Rule  
**DESCRIPTION:** Number must always begin with an 'A'  
**CONTEXT:** ACME  
**SELECTOR:** ATTRIBUTE\_RULE  
**ENABLED** true  
**BLOCK** 1  
**CONFIG** {CAGE\_CODE=[ACM01,ACM02,ACM03,ACM04],  
objectType=wt.part.WTPart, number=BEGINSWITH(A)}

## CREATING BUSINESS RULES – (Custom Approach)

- **Requirements**
  - Required Attributes must be set
  - Number must start with an 'A'
  - Number must end with a '-PT'
  - Number cannot contain special characters
  - Part cannot be from a vendor

## EXAMPLES ATTRIBUTES

**Edit Rule**

Edit Rule Properties

Attribute	Current	New
RULE ID	RC_ATTRIBUTE_RULE	Cannot Modify
SET	ROCKET_CONFIG	ROCKET_CONFIG ▼
NAME	Attribute Rule	Attribute Rule
DESCRIPTION	Verify required attributes are filled in.	Verify required attributes are 1
CONTEXT	ACME	(ORG) - ACME ▼
ENABLED	true	true ▼
BLOCK	2	2
CONFIG	<input type="text"/>	<input type="text"/> Add Config
SELECTOR	ATTRIBUTE_RULE	ATTRIBUTE_RULE ▼

## EXAMPLES ATTRIBUTES

**Edit Rule**

	KEY	VALUE	
Attribute	CAGE_CODE	SET	Add Config
RULE ID	SET		Close
NAME	Attribute Rule	Attribute Rule	
DESCRIPTION	Verify required attributes are filled in.	Verify required attributes are 1	
CONTEXT	ACME	(ORG) - ACME	
ENABLED	true	true	
BLOCK	2	2	
CONFIG			Add Config
SELECTOR	ATTRIBUTE_RULE	ATTRIBUTE_RULE	

Save Delete

## EXAMPLES ATTRIBUTES

**Edit Rule**

Edit Rule Properties

Attribute	Current	New
RULE ID	RC_ATTRIBUTE_RULE	Cannot Modify
SET	ROCKET_CONFIG	ROCKET_CONFIG ▼
NAME	Attribute Rule	Attribute Rule
DESCRIPTION	Verify required attributes are filled in.	Verify required attributes are 1
CONTEXT	ACME	(ORG) - ACME ▼
ENABLED	true	true ▼
BLOCK	2	2
CONFIG	CAGE_CODE=SET, DESIGN_AUTH=SET, ITAR_CONTROLLED=SET, WEIGHT=SET,	Add Config
SELECTOR	ATTRIBUTE_RULE	ATTRIBUTE_RULE ▼

Save Delete

## EXAMPLES BOM RELEASE

- Create Set

**Business Rules**

Business Rule Sets

Choose Business Rule Set

## EXAMPLES BOM RELEASE

- Create Set

**New Set**

Edit Set Properties

Attribute	Value
SET ID	<input type="text" value="ROCKET_RELEASE"/>
NAME	<input type="text" value="Rocket Release"/>
DESCRIPTION	<input type="text" value="This will check states of ch"/>
CONTEXT	<input type="text" value="(ORG) - ACME"/>
ENABLED	<input type="text" value="true"/>
OVERRIDABLE	<input type="text" value="true"/>

## EXAMPLES BOM RELEASE

- Create Set
- Create Rule

**Business Rules**

Business Rule Sets

Choose Business Rule Set

**SET**

**ID:** ROCKET\_RELEASE  
**NAME:** Rocket Release  
**DESCRIPTION:** This will check states of child objects  
**CONTEXT:** Site  
**ENABLED:** true  
**OVERRIDABLE:** true

## EXAMPLES BOM RELEASE

- Create Set
- Create Rule

**New Rule**

Edit Rule Properties

Attribute	Value
RULE ID	RR_VALIDATE_CHILDREI
SET	ROCKET_RELEASE ▾
NAME	Validate Children
DESCRIPTION	Check that all dependent p
CONTEXT	(ORG) - ACME ▾
ENABLED	true ▾
CONFIG	
SELECTOR	BOM_RELEASE_RULE ▾

Example: {key1=value3, objectType=wt.part.WTPart}

Save

## EXAMPLES BOM RELEASE

- Create Set
- Create Rule

### Edit Rule

Edit Rule Properties

Attribute	Current	New
<b>RULE ID</b>	RR_VALIDATE_CHILDREN	Cannot Modify
<b>SET</b>	ROCKET_RELEASE	<input type="text" value="ROCKET_RELEASE"/>
<b>NAME</b>	Validate Children States	<input type="text" value="Validate Children States"/>
<b>DESCRIPTION</b>	Validates that all the dependent objects are at a valid state.	<input type="text" value="Validates that all the deper"/>
<b>CONTEXT</b>	ACME	<input type="text" value="(ORG) - ACME"/>
<b>ENABLED</b>	true	<input type="text" value="true"/>
<b>BLOCK</b>	1	<input type="text" value="1"/>
<b>CONFIG</b>	<input type="text"/>	<input type="button" value="Add Config"/>
<b>SELECTOR</b>	BOM_RELEASE_RULE	<input type="text" value="BOM_RELEASE_RULE"/>

## EXAMPLES BOM RELEASE

- Create Set
- Create Rule
- Add configs
  - targetState
  - collectionComponentID
  - validDependentState

**Edit Rule**

Edit Rule Properties

Attribute	Current	New
RULE ID	RR_VALIDATE_CHILDREN	Cannot Modify
SET	ROCKET_RELEASE	ROCKET_RELEASE
NAME	Validate Children States	Validate Children States
DESCRIPTION	Validates that all the dependent objects are at a valid state.	Validates that all the deper
CON	KEY	VALUE
ENA	targetState	RELEASED
BLO		
CONFIG		Add Config
SELECTOR	BOM_RELEASE_RULE	BOM_RELEASE_RULE

Save Delete

## EXAMPLES BOM RELEASE

- Create Set
- Create Rule
- Add configs
  - targetState
  - collectionComponentID
  - validDependentState

**Business Rules**

Business Rule Sets

Choose Business Rule Set

**SET**

**ID:** ROCKET\_RELEASE  
**NAME:** Rocket Release  
**DESCRIPTION:** This will check states of child objects  
**CONTEXT:** ACME  
**ENABLED:** true  
**OVERRIDABLE:** true

**RULE**

**ID:** RR\_VALIDATE\_CHILDREN  
**NAME:** Validate Children States  
**DESCRIPTION:** Validates that all the dependent objects are at a valid state.  
**CONTEXT:** ACME  
**SELECTOR:** BOM\_RELEASE\_RULE  
**ENABLED:** true  
**BLOCK:** 1  
**CONFIG:** {collectionComponentID=COLLECT\_ITEMS\_FOR\_BOM\_RELEASE\_RULE, targetState=RELEASED, validDependentState=RELEASED}

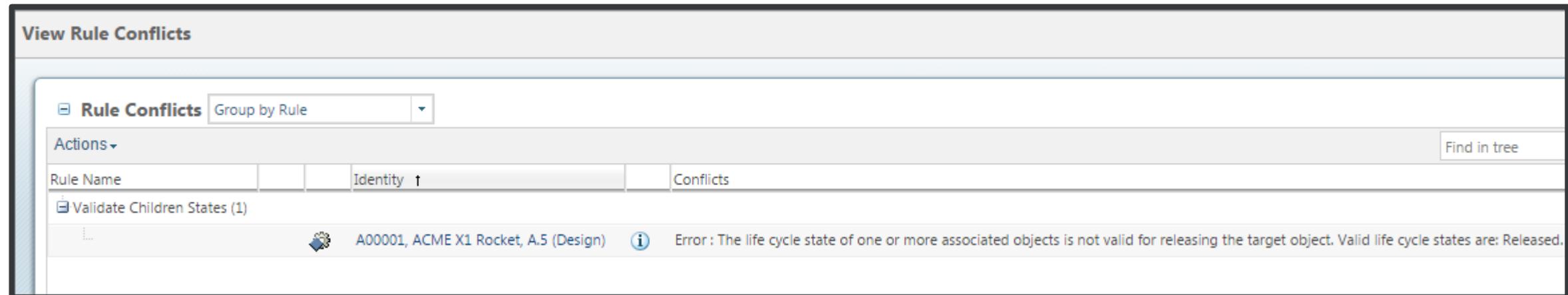
## EXAMPLES BOM RELEASE

- **Release End Item**
  - Structure has items In-Work

ACME X1 Rocket	In Work
SRB	Released
Stage 1	Released
LF Engine 1	Released
LF Tank 1	Released
Stage 2	Released
LF Engine 2	Released
LF Tank 2	Released
Stage 3	In Work
Command Module	Released
Escape Tower	In Work
Fairing	Released
LF Engine 3	Released
LF Tank 3	Released
Service Module	Released

## EXAMPLES BOM RELEASE

- View Conflicts as usual



**View Rule Conflicts**

Rule Conflicts Group by Rule

Actions Find in tree

Rule Name	Identity ↑	Conflicts
Validate Children States (1)		
	A00001, ACME X1 Rocket, A.5 (Design)	Error : The life cycle state of one or more associated objects is not valid for releasing the target object. Valid life cycle states are: Released.

## References

- **Windchill Help Center**
  - [http://support.ptc.com/cs/help/windchill\\_hc/wc101\\_hc/index.jsp?id=BusRules&action=show](http://support.ptc.com/cs/help/windchill_hc/wc101_hc/index.jsp?id=BusRules&action=show)
- **Windchill eSupport**
- **Windchill Javadocs**
- **W3Schools – XML Syntax**
  - [http://www.w3schools.com/xml/xml\\_syntax.asp](http://www.w3schools.com/xml/xml_syntax.asp)



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