Aras Innovator 11
Programmer’s Guide

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- Do you need more information? If so, where and what level of detail?
- Are the examples correct? Do you need more examples?
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Document Conventions

The following table highlights the document conventions used in the document:

Table 1: Document Conventions

<table>
<thead>
<tr>
<th>Convention</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bold</td>
<td>This shows the names of menu items, dialog boxes, dialog box elements, and commands. Example: Click <strong>OK</strong>.</td>
</tr>
<tr>
<td>Code</td>
<td>Code examples appear in <em>courier text</em>. It may represent text you type or data you read.</td>
</tr>
<tr>
<td>Yellow highlight</td>
<td>Code with yellow highlight is used to draw attention to the code that is being indicated in the content.</td>
</tr>
<tr>
<td>Yellow highlight with red text</td>
<td>Red color text with yellow highlight is used to indicate the code parameter that needs to be changed or replaced.</td>
</tr>
<tr>
<td>Italics</td>
<td>Reference to other documents.</td>
</tr>
<tr>
<td>Note:</td>
<td>Notes contain additional useful information.</td>
</tr>
<tr>
<td>Warning</td>
<td>Warning contains important information. Pay special attention to information highlighted this way.</td>
</tr>
<tr>
<td>Successive menu choices</td>
<td>Successive menu choices may appear with a greater than sign (--&gt;) between the items that you will select consecutively. Example: Navigate to <em>File --&gt; Save --&gt; OK</em>.</td>
</tr>
</tbody>
</table>
1 Introduction

The purpose of this document is to provide a Guide to Programming Aras Innovator. It covers key aspects of programming Aras Innovator for implementing your own business logic within the Aras Innovator Enterprise Application Framework.

This document is intended to be used as a Desktop Reference and User Guide covering the following topics:

- The AML (Aras Markup Language), which is the language that drives the Aras Innovator server.
- The IOM (Innovator Object Model), which is the Object API for the AML.
- Explains how Methods work and the Methodology for implementing your own business logic.
- A Cookbook of recipes for performing common tasks.
- The .NET controls API the Innovator Client is built on.

1.1 The Item

Everything in Aras Innovator is an Item, which is an instance of an ItemType, which itself is an Item; illustrating that Aras Innovator is a self-describing system. Don't get hung up on the self-describing nature on Aras Innovator and focus on the simplicity that eventually is an Item.

Items may have relationships to other Items illustrating that Items has structure. Relationships are defined by RelationshipType, which is an Item that has three properties to define the RelationshipType rule for the source (parent) Item, related (child) Item, and relationship Item, which defines. When the RelationshipType is created an 'is_relationship' ItemType is also created named the same as the RelationshipType and its id is the value to the relationship_id Property on the RelationshipType. This can get a bit confusing but simply put there is a RelationshipType/ItemType pairing to define the RelationshipType rule and an ItemType to store the relationship Items.

Relationship Items have a related_id Property of type Item, which is the related (child) Item for the relationship. The related_id Property is a link that points to an Item. The relationship Item also has a source_id Property of type Item and is the source (parent) Item for the relationship.

So, in Aras Innovator everything is an Item, and Items may have relationships, which are Items that has source and related Item Properties forming an Item configuration.

For example, an ItemType Item has Property relationships and this Item configuration maps directly to the relational database for persistent storage of the Item instances. Every ItemType has a matching relational TABLE where the Property names are the COLUMN names.

1.2 The Aras Markup Language (AML)

The Aras Markup Language (AML) is an XML dialect that follows the simple /Item/Relationships/Item/Relationships repeating pattern to describe Item configurations. Clients submit AML documents to the Aras Innovator server and receive an AML document back.

An AML document contains data (Items), structure (Relationships, which are hierarchical Items), and logic (an action to perform some business logic on the Item). Each Item in the AML document has an action attribute, which is the name of an Aras Innovator Method that performs business logic on the Item. The Aras Innovator server interprets AML documents similar to scripting languages, AML documents are often referred to as AML scripts.
This is an example of a BOM in AML language:

```aml
<Item type="Part" action="add">
  <item_number>999-888</item_number>
  <description>Some Assy</description>
  <Relationships>
    <Item type="Part BOM" action="add">
      <quantity>10</quantity>
      <related_id>
        <Item type="Part" action="add">
          <item_number>123-456</item_number>
          <description>1/4w 10% 10K Resistor</description>
        </Item>
      </related_id>
    </Item>
  </Relationships>
</Item>
```

### 1.3 Methods and the IOM

The IOM (Innovator Object Model or Item Object Model) is an Object Model on top of the AML. It provides the ability to build and submit AML documents to the Aras Innovator Server using a simple Object API.

There is the 'Method' Item Type, which are used to implement user defined business logic. Methods are written in JavaScript, C#, or VB.Net and use the IOM API to implement the business logic.

The following is a Method in JavaScript using the IOM that is the same as the AML BOM example above:

```javascript
var innovator = new Innovator();
var partItem = innovator.newItem("Part","add");
partItem.setProperty("item_number", "999-888");
partItem.setProperty("description", "Some Assy");

var bomItem = innovator.newItem("Part BOM","add");
bomItem.setProperty("quantity", "10");

var relatedItem = new Item("Part","add");
relatedItem.setProperty("item_number", "123-456");
relatedItem.setProperty("description", "1/4w 10% 10K Resistor");

bomItem.setRelatedItem(relatedItem);
partItem.addRelationship(bomItem);

var resultItem = partItem.apply();
```
2 AML

The AML is the XML dialect and language that drives the Aras Innovator server. Clients submit AML documents to the Aras Innovator server via HTTP. The server parses the AML applying the business logic defined as the action attribute for the Items in the AML document, and an AML document is returned. The AML dialect is very simple and the following tags define the AML language:

2.1 <Item> Tag

The <Item> tag defines an Item instance. XML is case sensitive (notice the capitalized Item.) There are three principle attributes for the Item tag to define the Item instance:

- id – the unique ID for the Item.
- type – the ItemType name for the Item.
- action – the name of the Method that is applied to the Item.

There are other attributes but these are the most significant, which defines the Item and the action to apply on it. The following is an AML query example requesting a Part Item by ID:

```aml
<Item type="Part" id="ACBDEF0123456789..." action="get"/>
```

Refer to section 4.2 Built in Action Methods for the list of Innovator pre-built actions.

2.2 <Relationships> Tag

Items can have relationships to other Items. The <Relationships> tag is a container tag that holds the set of relationship Items. Again notice the capitalized Relationships. There are no attributes for the tag it is a container. With relationships it is possible to describe an Item configuration to any level deep as necessary.

The following is an AML query example requesting a Part Item and its BOM relationships:

```aml
<Item type="Part" id="ACBDEF0123456789..." action="get">
  <Relationships>
    <Item type="BOM" action="get"/>
  </Relationships>
</Item>
```

2.3 <property> Tags

Properties for the Item are the nested tags directly below the <Item> tag. The Property name is the tag name. For example, a ‘Part’ ItemType may have the properties: item_number, description, and cost, which are also the tag names in the AML. Property names are lowercase so the property tag names are also lowercase.
The following AML illustrates a simple Item configuration for describing a Part to Part BOM relationship:

```
<Item type="Part" action="add">
    <item_number>999-888</item_number>
    <description>Some Assy</description>
    <Relationships>
        <Item type="Part BOM" action="add">
            <quantity>10</quantity>
            <related_id>
                <Item type="Part" action="add">
                    <item_number>123-456</item_number>
                    <description>1/4w 10% 10K Resistor</description>
                </Item>
            </related_id>
        </Item>
    </Relationships>
</Item>
```

Property values always use locale-neutral formats. Decimal and float values use the period symbol (.) as the decimal separator and no digit separator (i.e. commas separating thousands). The dash symbol (-) is used to denote a negative value. Date/Time values should be in 'YYYY-MM-DD[Thh:mm:ss]' format and in the local (or corporate) time zone. Language-specific values use the xml:lang attribute to specify the language code. For example:

```
<Item type="Part">
    <item_number>292-102</item_number>
    <i18n:name xml:lang="de" xmlns:i18n="http://www.aras.com/I18N">Rad</i18n:name>
    <i18n:name xml:lang="en" xmlns:i18n="http://www.aras.com/I18N">Wheel</i18n:name>
    <cost>232.13</cost>
    <created_on>2008-08-24T08:12:02</created_on>
</Item>
```

### 2.4 Attributes

Properties are used to define the data for an Item; attributes are meta-data for the Item or Property, which are used to control the server logic and Methods. Think of attributes like command line switches, or as arguments to a function.

In addition to the type, id, and action attributes mentioned above there are several additional attributes used to control the server. The following is the attribute reference for the <Item> tag:

#### 2.4.1 Item Attributes

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Type</th>
<th>Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>type</td>
<td>String</td>
<td>The ItemType name for which the Item is an instance.</td>
</tr>
<tr>
<td>id</td>
<td>String</td>
<td>The unique ID value for the Item instance.</td>
</tr>
<tr>
<td>Attribute</td>
<td>Type</td>
<td>Usage</td>
</tr>
<tr>
<td>-------------</td>
<td>----------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| where       | String   | Used instead of the id attribute to specify the WHERE clause for the search criteria. Include the table name with the column name using the dot notation: where='user.first_name like 'Tom%'
| action      | String   | The name of the Method (or Built in Action Method) to apply to the Item.                                                              |
| doGetItem   | Boolean  | If 0 then do not perform a final get action on the Item after the server performed that action as defined by the action attribute. Default is 1. |

**Used with action="get"**

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Type</th>
<th>Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>select</td>
<td>String</td>
<td>A comma delimited list of property names (column names) to return which is the SELECT clause in the SQL statement.</td>
</tr>
<tr>
<td>orderBy</td>
<td>String</td>
<td>A comma delimited list of property names (column names) to order the results and is the ORDER BY clause in the SQL statement.</td>
</tr>
<tr>
<td>page</td>
<td>Integer</td>
<td>The page number for the results set.</td>
</tr>
<tr>
<td>pagesize</td>
<td>Integer</td>
<td>The page size for the results set.</td>
</tr>
<tr>
<td>maxRecords</td>
<td>Integer</td>
<td>This defines the absolute maximum Items to be searched in the database.</td>
</tr>
<tr>
<td>levels</td>
<td>Integer</td>
<td>The Item configuration depth to be returned. This should be used with caution because of the performance hit due to its lack of granularity in the data fetched. Use the nested Relationships style of defining your queries to do the same thing but with far greater performance.</td>
</tr>
<tr>
<td>serverEvents</td>
<td>Boolean</td>
<td>If 0 then disable the server events improving performance. Default is 1.</td>
</tr>
<tr>
<td>isCriteria</td>
<td>Boolean</td>
<td>If 0 then include the nested structure for the Item configuration in the response but don't use it as search criteria. Default is 1, which uses the nested structure in the request as search criteria.</td>
</tr>
<tr>
<td>related_expand</td>
<td>Boolean</td>
<td>If 0 then do not expand the related_id Property for the relationship Items to include the related Item. Another word returns its ID.</td>
</tr>
<tr>
<td>language</td>
<td>String</td>
<td>A comma-delimited list of language codes, or &quot;*&quot; to return all languages. Multilingual property values is returned (if present) for all specified languages.</td>
</tr>
</tbody>
</table>

**Used with action="update" | “edit”**

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Type</th>
<th>Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>version</td>
<td>Boolean</td>
<td>If 0 then don't version an Item on update. Default is 1, which is version the Item (if it's a versionable Item) on update.</td>
</tr>
</tbody>
</table>
### Attribute Types

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Type</th>
<th>Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>serverEvents</td>
<td>Boolean</td>
<td>If 0 then disable the server events improving performance. Default is 1. Only ‘Update’ events are disabled, ‘Lock’ events can be executed if using ‘Edit’.</td>
</tr>
</tbody>
</table>

### 2.4.2 Property Attributes

Table 3:

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>type</td>
<td>The ItemType name for which the item is an instance of.</td>
</tr>
<tr>
<td>keyed_name</td>
<td>This is the keyed_name Property for the Item referenced by the Item type Property.</td>
</tr>
<tr>
<td>condition</td>
<td>This is the condition value for the AML query. The condition value is any valid SELECT condition supported by the database. This is the list of possible condition values:</td>
</tr>
</tbody>
</table>

#### Condition

<table>
<thead>
<tr>
<th>Condition</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>eq</td>
<td>The SQL conditional symbols: <code>=, &lt;&gt;, &lt;=, &gt;=, &gt;, &lt;</code></td>
</tr>
<tr>
<td>ne</td>
<td>are expressed as two letter mnemonic word: eq, ne, le, ge, gt, and lt</td>
</tr>
<tr>
<td>ge</td>
<td>Example: <code>&lt;name condition=&quot;gt&quot;&gt;100&lt;/name&gt;</code></td>
</tr>
<tr>
<td>le</td>
<td></td>
</tr>
<tr>
<td>gt</td>
<td></td>
</tr>
<tr>
<td>lt</td>
<td></td>
</tr>
<tr>
<td>like</td>
<td>The value for the Property tag would include wild card symbols, which are <code>%</code> for any characters and <code>_</code> for a single character.</td>
</tr>
<tr>
<td>not like</td>
<td>Example: <code>&lt;name condition=&quot;like&quot;&gt;Tom%&lt;/name&gt;</code></td>
</tr>
<tr>
<td>between</td>
<td>This is a range condition and you would include the AND keyword in the Property tag value.</td>
</tr>
<tr>
<td>not between</td>
<td>Example: <code>&lt;cost condition=&quot;between&quot;&gt;10.00 and 50.00&lt;/cost&gt;</code></td>
</tr>
<tr>
<td>in</td>
<td>This is a set based condition where the value for the Property tag is a comma delimited list of values for the set.</td>
</tr>
<tr>
<td>not in</td>
<td>Example:</td>
</tr>
<tr>
<td>Attribute</td>
<td>Usage</td>
</tr>
<tr>
<td>-----------</td>
<td>-------</td>
</tr>
<tr>
<td></td>
<td><code>&lt;name condition=&quot;in&quot;&gt;'Tom', 'Peter', 'Joe'&lt;/name&gt;</code></td>
</tr>
<tr>
<td><code>is</code></td>
<td>Possible values for the Property tag could be null or not null.</td>
</tr>
<tr>
<td><code>is null</code></td>
<td>Example:</td>
</tr>
<tr>
<td><code>is not null</code></td>
<td><code>&lt;cost condition=&quot;is null&quot;/&gt;</code></td>
</tr>
<tr>
<td><code>is not null</code></td>
<td><code>&lt;cost condition=&quot;is not null&quot;/&gt;</code></td>
</tr>
<tr>
<td><code>Xml:lang</code></td>
<td>Language code for multilingual properties. Must be used in conjunction with the internationalization namespace on the property tag. For example:</td>
</tr>
<tr>
<td></td>
<td><code>&lt;i18n:name xml:lang=&quot;de&quot; xmlns:i18n=&quot;http://www.aras.com/I18N&quot;&gt;Rad&lt;/i18n:name&gt;</code></td>
</tr>
</tbody>
</table>
3 IOM Reference

IOM Reference provides a general description of the IOM (Innovator Object Model or Item Object Model) API. A more detailed API reference may be obtained from one of the following:

- **From Innovator Client UI**: Login as Innovator Administrator. Under the Help menu, select API Reference.
- **In Innovator CD Image**: Go to the documentation folder and open [Aras Innovator - API Guide.html](file:Aras%20Innovator%20-%20API%20Guide.html).

The IOM is an Object Model for the AML, but it is not purely Object Oriented. Using Object Oriented terms, an ItemType is like a ‘Class’ and the Item is like an ‘Object’. Although the Item is an Object with methods, there is only one Item Class for all ItemTypes. In a pure Object Oriented representation, there would be a Class for each ItemType because each ItemType has its own set of Properties to describe the different Items.

An Item Object is intended to be abstract and pliable; depending of its internal structure, the Item Object usually represents one of five following supported types of IOM Items:

- **Single** Innovator Item of an arbitrary ItemType.
- **Set** of Innovator Items, as in the case for results of the action ‘get’ when more than one Item returns.
- **Error**, as in the case when an action request results in error from the Innovator Server.
- **Result** to represent an arbitrary text wrapped by <Result> XML tags.
- **Logical** to represent a set of properties wrapped in logical statement by one of logical XML tags: <or>, <and>, or <not>; usually used to specify the search criteria for the action ‘get’.

The IOM is intended to be a generic and compact API for modeling the Item structure of the AML as abstract Objects. The majority of the methods for the IOM deals with memory management of the AML document for the Item Object. The AML is a script sent as a message to the Aras Innovator Server; the IOM is an Object API to build the AML messages, submit them to the Innovator Server and parse an AML document that is returned by the Server.

There are two major types of methods in the Item Class: methods that only work with item’s AML in memory and methods that communicate with the Server, i.e. send request(s) to and get response(s) from the server. All get/set type of methods as well as isXXX(...) (e.g. isError(), isCollection(), etc.) and add/remove methods (e.g. addRelationship(...), removeProperty(...), etc.) belong to the former group. Methods like fetchXXX(...) (e.g. fetchLockStatus()), apply(...), email(...), promote(...), lock\unlockItem(...), etc. belong to the latter group. In case method sends a request to the server it must be explicitly mentioned in the API reference method comments.
3.1 IOMCredentials Class

The IOMCredentials Class defines the login credentials for connecting to the Aras Innovator Server. The Item Class has a credentials public property, which is an IOMCredentials Object.

Typically, you do not need to know about or deal with the credentials Object because the Methods run in logged in session. You can, however, set the credentials for the Item Object using these methods, if you want to submit the apply requests to a different Aras Innovator server. The IOMCredentials Class methods are mostly getters and setters for URLs (Innovator and Vault servers), DB name, and login name and password.

3.2 Innovator Class

In Innovator Class, methods like applyAML(...), applyMethod(...), and applySQL(...), being type Item, send the apply request to the Aras Innovator Server. In response, the Server creates XML that apply methods use to construct an Item Object to return; methods like getItemById(...) and getItemByKeyedName(...) search the database the logged in session is connected to, and methods like newItem(...), newError(...) and newResult(...) construct a new instance of the Item Object.

Other members of this class perform miscellaneous non-Item related operations. Use them if you need to get a new GUID (methods getNextSequence(...) and getNewID()), generate a next sequence value (method getNextSequence(...) ), or calculate the MD5 hash value for a given string (method ScalcMD5(...) ).

3.3 Item Class

An Item Object can represent an Item, or a set of Items, or an Error.

Item public constructor has one required argument itemtype-name and one optional argument action. The new Item is only populated with the Properties and default values from the ItemType when the optional action argument is ‘add’.

The Item Class public field dom represents a DOM Object that holds the data for the Item in the AML format.

3.3.1 Base Methods

The Item Class base method apply(...) submit the AML apply request to Innovator Server using the context Item DOM as AML source and returns a new Item built on the XML returned by the Server. In contrast, the base method loadAML(...) does not return a new Item but rather rebuilds this.dom using AML taken as an argument.
You can call `clone(…)` method to get a new identical instance of the context Item and you can call `setNewID()` method to replace the context Item id by newly generated GUID.

### 3.3.2 Boolean Methods

Call method `isCollection()` to find out whether or not the Item represents a set of Items, e.g. whether or not its dom property holds more than one Item node. Call `isError()` method to find out whether or not the Item represents an Error. See IOM API on-line reference for more boolean members of the Item Class.

### 3.3.3 Attribute Methods

Methods such as `getAction()`, `getID()`, and `getType()` return a value of Item node action, id, and type attribute respectively, while method `getAttribute(…)` takes an attribute-name as an argument and, therefore, can be used to get any attribute by name. Thus, `getAction()` is a short cut to `getAttribute(“action”)`, `getID()` is a short cut to `getAttribute(“id”)`, and so on.

Each get method in this group has a corresponding set method: `setAction(…), setID(…), setType(…), and setAttribute(…)`. Notice that method `setAttribute(…)` not only sets new value for an existing attribute but can also add a new attribute to the Item node and then sets its value.

### 3.3.4 Property Methods

Property methods comprise set of accessors to Item properties and Item property’s attributes: `get_`, `set_` (which acts also as `add_`), and `remove_`. In addition, if property has/need a nested Item there are methods to get/insert such nested Item.

Accessors to Properties are `getProperty(…), setProperty(…), and removeProperty(…).` These methods take then property name as an argument.

Accessors to Property’s attribute are `getPropertyAttribute(…), setPropertyAttribute(…), and removePropertyAttribute(…)`. These methods take property and attribute names as arguments.

Method `setProperty(…)/setPropertyAttribute(…)` not only sets new value for an existing Item property/ property’s attributes but creates new property/ property’s attributes and then sets its value if the property/ property’s attributes with a given name does not yet exist.

The `setProperty` method requires property values to be in a locale-neutral format. Decimal and float values should use the period symbol (.) as the decimal separator and no digit separator (i.e. commas separating thousands). The dash symbol (-) should be used to denote a negative value. Date/Time values should be in ‘YYYY-MM-DD[Thh:mm:ss]’ format and in the local (or corporate) time zone. Language-specific values should be set using the language code as the third argument.

Accessors to Property’s nested Item are: `getPropertyItem(…), setPropertyItem(…), and createPropertyItem(…)`. All these methods take property name as an argument, and method `setPropertyItem(…)` needs, in addition, an Item Object as the second argument to create a DOM for the nested Item.
### 3.3.5 Relationship Methods

Relationship methods comprise set of Item’s relationship accessors: `getRelationships(...)`, `addRelationship(...)`, `createRelationship(...)`, and `removeRelationship(...)`. The difference between `createRelationship(…)` and `addRelationship(…)`, two methods that both are adding an Item node to the Relationship parent node, is subtle. Let’s consider the following server-side VB method to illustrate how `createRelationship(…)` works:

```vbnet
Dim myInnovator As Innovator = Me.getInnovator()
Dim myItem As Item = myInnovator.NewItem("myType","myAction")
myItem.createRelationship("User","add")
```

This code results in following myItem.dom XML:

```
<Item isNew="1" isTemp="1" type="myType" action="myAction">
  <Relationships>
    <Item isNew="1" isTemp="1" type="User" action="add"/>
  </Relationships>
</Item>
```

Similar code that exercises `addRelationship(…)` methods is:

```vbnet
Dim myInnovator As Innovator = Me.getInnovator()
Dim myItem As Item = myInnovator.NewItem("myType","myAction")
Dim relItem As Item = myInnovator.NewItem("User","add")
myItem.addRelationship(relItem)
```

and this code results in following myItem.dom XML:

```
<Item isNew="1" isTemp="1" type="myType" action="myAction">
  <Relationships>
    <Item isNew="1" isTemp="1" type="User" action="add"
      id="7EA3F18935CC493A900DAB63E839FDA2">
      <classification/>/*</classification>
      <default_vault>67BBB9204FE84A8981ED8313049BA06C</default_vault>
    </Item>
  </Relationships>
</Item>
```

As you can see `addRelationship(…)` produces in this case more detailed Item node under the Relationship parent node.

There are three methods `getRelatedItem(…)`, `setRelatedItem(…)`, and `createRelatedItem(…)` that are valid for relationship Item only and are used as a short cut to the `Item.getPropertyItem()` methods.

### 3.3.6 Item Collection Methods

This group comprises methods to work with collections. Collection in this context is a set of Items as in the case for results from a query. Method `appendItem(…)` appends its Item Object argument to an existing collection or converts a single Item instance to set of Items. This mechanism is illustrated in a C# sample below:

```csharp
Innovator myInnovator = this.getInnovator();
Item myItem = myInnovator.newItem("myType","myAction");
```
At this point, myItem presents a single Item instance, myItem.dom XML looks like this:

```xml
<Item isNew="1" isTemp="1" type="myType" action="myAction" />
```

and myItem.isCollection() returns false. But three extra line of code:

```java
Item addedItem = myInnovator.newItem("added","myAction");
// set ID to be able to remove addedItem later
addedItem.setId(myInnovator.getId());
myItem.appendItem(addedItem);
```

converts myItem to a collection, e.g. myItem.isCollection() returns true, and myItem.dom XML becomes as following:

```xml
<AML>
  <Item isNew="1" isTemp="1" type="myType" action="myAction" /> 
  <Item isNew="1" isTemp="1" type="added" action="myAction" id="B12F9384B1DE4C4F8158C36D18269BE9"/>
</AML>
```

If the Item object id is not NULL it can be removed from the collection:

```java
myItem.removeItem(addedItem);
```

Use getItemCount() method to determine the size of a collection, getItemByIndex(...) method to get an instance of the Item Object based on its position inside of the collection, and method getItemsByXPath(...) to find an Item by its XPath.

### 3.3.7 Logical Methods

The methods newOR(), newAND(), and newNOT() insert logical node with tag <or>, <and> and <not> respectively under the parent Item node and return an Item Object that represent a newly inserted logical node. For example, the code below:

```java
Innovator myInnovator = this.getInnovator();
Item myItem = myInnovator.newItem("myType","myAction");
Item logicalOR = myItem.newOR();
logicalOR.setProperty("foo", "bar");
```

produces the following myItem.dom XML:

```xml
<Item isNew="1" isTemp="1" type="myType" action="myAction">
  <or>
    <foo>bar</foo>
  </or>
</Item>
```

The method removeLogical(...) removes a logical node specified by method’s argument.

### 3.3.8 Creating New Item Method

User can create a new item using method newItem(...). See code samples in sections 3.3.6-3.3.8 for the method usage illustration.

### 3.3.9 Error Methods

Error methods comprise set of accessors to Error specific properties such as “faultcode” (methods get/setErrorCode(...),) “faultstring” (methods get/setErrorString(...),) “faultactor” (get/setErrorSource(...),) and “detail” (methods get/setErrorDetail(...).)
Thus, the code sample below:

```java
Innovator myInnovator = this.getInnovator();
Item error = myInnovator.newError("default detail");
error.setErrorCode("any number");
error.setErrorString("Hello, World");
error.setErrorSource("myMethod");
error.setErrorDetail("new detail");
```

produces the following Error Item DOM:

```xml
<Envelope xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <Body>
    <Fault>
      <faultcode>any number</faultcode>
      <faultstring>Hello, World</faultstring>
      <faultactor>myMethod</faultactor>
      <detail>new detail</detail>
    </Fault>
  </Body>
</Envelope>
```

### 3.3.10 Extended Item Class methods

This set of methods implements specific functionality on the Item, which extends the base Item Class. For purpose of reference all the Extended Item Class methods are organized in four categories:

- **Getting Innovator reference method:**
  
  ```java
  getInnovator() – see examples of usage in sections 3.2.
  ```

- **Lock methods:**
  
  ```java
  lockItem()
  unlockItem()
  ```

- **Life Cycle method:**
  
  ```java
  promote(...)  
  ```

- **Workflow methods:**
  
  ```java
  instantiateWorkflow(...)  
  ```

The following methods are obsolete and will be removed from future releases:

- `startWorkflow(...)` - **use** `Item.apply("startWorkflow")` **instead.**
- `cancelWorkflow(...)` - **use** `Item.apply("cancelWorkflow")` **instead.**
- `closeWorkflow(...)` - **use** `Item.apply("closeWorkflow")` **instead.**

The detailed characteristic and usage illustration of methods above is left outside the scope of the document. See on-line API reference for more details.
4 Methods

Business logic in Aras Innovator is implemented using Method Items and are written in JavaScript, C#, or VB.Net often using the IOM to interact with Aras Innovator Items.

There are three ways to implement Methods in Aras Innovator on the server side:

- Item Action Methods which extend the Item Class and perform logic on Item instances.
- Generic Methods, which implement arbitrary logic.
- Server Events which implement logic on the context Item before and/or after the server operates on the Item.

Similarly there are three ways to implement Methods in Aras Innovator on the client side:

- Item Methods which extend the Item Class and perform logic on Item instances.
- Generic Methods, which implement arbitrary logic.
- Form, Field, and Grid Events which implement logic on client side UI events.
- Client Events that can be attached to an Item Type; triggered when user’s interaction with Innovator UI generate a new Item.

The Method Item has a comment Property that you can use to annotate the Method and can be seen when you search and review the Methods as mentioned above.

4.1 Item Actions Extend the Item Class

One purpose for Methods is to extend the Item Class. Methods extend the Item Class when they are bound as the related Item for 'Item Action' relationships on the ItemType. In the AML the Method name is the action attribute name for the Item tag.

<Item type="My ItemType" action="My Method" id="..."/>

The Method could be called using the IOM like this (all three examples below are equivalent and are written in C#):

1) Item myItem = this.newItem("My ItemType", "My Method");
   myItem.setID(this.getID());
   Item results = myItem.apply();
2) Item myItem = this.newItem("My ItemType");
   myItem.setID(this.getID());
   Item results = myItem.apply("My Method");
3) Item myItem = this.newItem();
   myItem.setID(this.getID());
   myItem.setType("My ItemType");
   myItem.setAction("My Method");
   Item results = myItem.apply();
4.1.1 Context Item

As it was mentioned above Item Action Methods are executed on an instance of Item which is called context item (read section 5 Action Items for more details on how context item is obtained for Item Action Methods). The context item must be referenced inside Item Action Methods as the `this` keyword in JavaScript, and C#, and the `Me` keyword Object in VB.Net. The context item is an instance of IOM Item class; correspondingly any methods of IOM Item class (see section 3.3 for more details) could be called on the context item, e.g `this.getProperty("foo")` (C#) or `Me.getProperty("foo")` (VB.Net).

| Note: | In order to be able to execute Method’s code Innovator plugs it into a particular template that provides required code attributes (method and class boundaries, import statements, etc.). Each supported language (JavaScript, C#, VB.NET, etc.) have several available templates in Innovator. All written in the section is applied to default templates (there is one default template per supported language). Methods can explicitly redefine the template that is used during the method compilation. Usage of alternative templates and methodology of writing valid Methods for them is left outside the scope of the document. |

4.1.2 Methods are Item Factories

Methods follow the Factory design pattern in that they return an Item or Error Object. The ‘Item Action’ Method must return an Item, which often is the result of an Item.apply() method call; typically the last step in the business logic for the Method. There are several ways to create an Item; the following IOM methods return an Item Object: `Item.apply()`, `Item.newItem()`, `Item.clone()`, `Innovator.newItem()`, `Innovator.newResult()`, and `Innovator.newError()`.

C#

```csharp
Item qryItem = this.newItem(this.getType(), "get");
qryItem.setID(this.getID());
qryItem.setLevels(1);
return qryItem.apply();
```

If the Method needs to return an Error then use the `Innovator.newError(text)` method.

C#

```csharp
Innovator innovator = this.getInnovator();
return innovator.newError("This method has <b>failed</b>."DataSetChanged);
```

4.1.3 Handling the Wrong ItemType

Sometimes it is desirable to share the same Method for many ItemTypes. However, there are cases in which the Method is intended to be used only by an Item of a specific ItemType.

The way you can prevent the use of a Method with a context item of a wrong type is to throw an exception when the wrong ItemType is used (this is what the core Item Class methods do when the ItemType is not of the specific desired value). Here is a sample of what should be done in a Method that needs to operate on a specific type of Item:
C#

Innovator innovator = this.getInnovator();
if (this.getType() != "My ItemType")
{
    return innovator.newError("Item must be of type 'My ItemType'");
}
return null;

4.1.4 Methodology

One of the principle concepts in programming Aras Innovator is to write Methods called on Items. The 'Item Action' relationships on ItemTypes simulate Object Oriented programming, where the ItemType is the Class and 'Item Action' relationships to Methods are the Class methods. Literally the Method code is compiled dynamically to extend the Item Class with this method and calls it (see also notes to 0). Similar to class instance in OO programming the context item is an object on which Methods are performed. At the same time there are some peculiarities in how to use context item in Innovator's Item Action Methods. One important details about Item Action Methods is that they must always return an Item which is considered as the result of work done by the Item Action Method. An Item Action Method might work with context item but the context item is used here more as an input value (it’s still must be referenced as this or Me from inside Methods). It’s highly recommended that Item Action Methods do not change the context item but rather create a new item that is returned from the method. You can use the combination of the Item.getProperty(...) method with the Item.setProperty(...) method to populate the new temporary Item or use the Item.clone(...) method to construct the new Item from the context item. If developer of Method’s code has choosen to modify the context item and not create a new item, the context item must be returned from the method.

4.2 Built in Action Methods

The Method name is passed as the action attribute for the <Item> tag in AML.

<Item type="My ItemType" action="My Method" id="..."/>

But in addition to Method names as the action attribute value there is also a set of ‘Built in Action Methods’. These are basically the same as Methods but you cannot find them in the database when searching the Method Items. Nevertheless, they are called the same way as ordinary Methods via the action attribute.

This is a reference for Built in Action Methods.

Table 4:

<table>
<thead>
<tr>
<th>Built in Action Method</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>add</td>
<td>Add the Item as an instance of an ItemType.</td>
</tr>
<tr>
<td>update</td>
<td>Updates the Item.</td>
</tr>
<tr>
<td></td>
<td>o The Item must be locked.</td>
</tr>
</tbody>
</table>
### Built in Action Method

<table>
<thead>
<tr>
<th>Action Method</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>○ If the Item is versionable and is being updated the first time since being locked the update versions the Item applying the update to the new version, unless the version=’0’ attribute is specified, which disables the versioning.</td>
<td></td>
</tr>
<tr>
<td>purge</td>
<td>Delete the version of the Item.</td>
</tr>
<tr>
<td>delete</td>
<td>Delete all versions of the Item. The purge and delete are the same for non-versionable Items.</td>
</tr>
<tr>
<td>get</td>
<td>Gets the Item(s) and its configuration based on the AML Item configuration used to query the database.</td>
</tr>
<tr>
<td>getItemConfig</td>
<td>This returns the Item configuration as described by the standard AML query. The AML in and out are no different than the standard action=’get’. The GetItemConfig is optimized by limiting the logic done between the SQL call and the AML result. The performance improvement is gained by limiting the features typically available in Innovator GetItem (no server events or access checking on the sub level Items).</td>
</tr>
<tr>
<td>edit</td>
<td>This locks, updates, and unlocks the Item.</td>
</tr>
<tr>
<td>create</td>
<td>This acts as a ‘get’ if the Item exists, otherwise acts as an ‘add’.</td>
</tr>
<tr>
<td>merge</td>
<td>This acts as an ‘edit’ if the Item exists, otherwise acts as an ‘add’.</td>
</tr>
<tr>
<td>lock</td>
<td>This locks the Item and is the same as the Item.lockItem() method.</td>
</tr>
<tr>
<td>unlock</td>
<td>This locks the Item and is the same as the Item.unlockItem() method.</td>
</tr>
<tr>
<td>version</td>
<td>This creates a new generation of an Item, clearing the locked_by_id of the originating Item and setting the locked_by_id in the new generation. It then applies an update to the newly created generation. The server events triggered in the following sequence: onBeforeVersion, onAfterVersion, onBeforeUpdate, onAfterUpdate. If the item is not versionable, an exception is thrown.</td>
</tr>
</tbody>
</table>

## 4.3 Generic Methods

Generic Methods are used to perform arbitrary business logic. They can be used to perform any logic you require and its input Item is up to you. They are called in the IOM with the Innovator.applyMethod(...) method.
4.3.1 Context Item

The context Item is the `this` keyword Object in JavaScript and C#, and is the `Me` Object in VB.Net. The XML data for the context Item is the XML submitted as the payload for the request and it may not be valid AML, just well formatted XML. It does not matter it is the input for the Generic Method and can be whatever you want it to be.

4.3.2 Methods are Item Factories

The Generic Method must return an Item or an Error similar to 'Item Action' Methods. Often the result of the Generic Method is some simply text or an HTML fragment. The text can be returned using the `Innovator.newResult(text)` method and if the Method needs to return an Error then use `Innovator.newError(text)` method.

C#

```csharp
Innovator innovator = this.getInnovator();
return innovator.newResult("This method was <b>successful</b>.");
OR
Innovator innovator = this.getInnovator();
return innovator.newError("This method has <b>failed</b>.");
```

C# Example

```csharp
Innovator innovator = this.getInnovator();
Item item = this.newItem("User", "get");
Item results = item.apply();

int count = results.getItemCount();
if (count<1) return innovator.newError("No users found.");

StringBuilder content = new StringBuilder();
content.Append("<table>");
for (int i=0; i<count; ++i)
{
    Item user = results.getItemByIndex(i);
    content.Append("<tr><td>Login Name:</td><td>");
    content.Append(user.getProperty("login_name"));
    content.Append("</td></tr>");
}
content.Append("</table>");
return innovator.newResult(content.ToString());
```

4.3.3 Methodology

Typically all you need are simply name/value pairs as input for your Method and those are like Property tags for the Item. The body for the Generic Method is nested inside an `<Item>` tag so you can pass name/value pair as arguments to the Generic Methods like ordinary Property tags. The Item passed as the context Item can represent any Item you want including fictitious Items, plus you have the added advantage of continuing using the IOM API to operate on the context Item Object.
4.4 Server Events

Purpose of Server Event Methods is to either perform some custom actions either before (OnBeforeXXX) or after (OnAfterXXX) a particular server action (like add, delete, etc.) or fully replace the action processing on server (OnXXX). Detailed information about available in Innovator server events could be found in section 4.4.3.

4.4.1 Context Item

In case of Server Event Method the context item is a direct analogy of a class instance (i.e. object) in OO programming in a sense that the Method operates on its context item (as it was mentioned above the context item could be referenced as the `this` keyword in JavaScript and C#, and the `Me` keyword Object in VB.Net from inside the Method). In other words the purpose of a Server Event could be defined as 'changing the context item', so modified context item is the result of work done by Server Event Method. Of course, Server Event Method doesn't necessarily have to alter its context item but rather perform some other actions (e.g. log some info; send e-mail; etc.); this is usually typical for Methods performed on OnAfterXXX event.

4.4.2 Methodology

A Server Event Method might return an Item only if it wants to return an error. Otherwise Server Event Method may not have a return statement.

C#

```
Innovator innovator = this.getInnovator();
return innovator.newError("This method failed.");
```

In the case Method is called as the OnBeforeXXX event and it returns an error, the context Item is replaced with an Error Item and is simply passed on through to the client and no further server action is taken. In the case of an OnAfterXXX event the server rolls back the transaction and passes the Error back on through to the client.

It's important to understand that Server Event Methods that are called on OnBeforeXXX events operate on request AML sent from client; Server Event Methods that are called on OnAfterXXX events operate on response AML that server is about to send back to client and Server Event Methods that fully replace server actions (OnXXX) get client request AML as context item and must replace it with response AML that is passed on through to the client. In other words, it's important to remember that Server Event Methods called on OnBeforeXXX events are invoked before server parses the request and after the Method is done the context item must have a valid request AML format (it could be modified by the method but it still should have a valid format so that server would be able to parse it). From other side, Server Event Methods called on OnAfterXXX events are invoked after server processed the request, and after the Method is done the context item must have a valid response AML format (it could be modified, e.g. Method could populate it with federated data, but it should be valid response AML, so that client would be able to parse it.)

4.4.3 Available Server Events

The following Server Events are currently available in Innovator. Each event below is followed by a short description and an example of common use.

- OnBeforeAdd
- OnBeforeAdd methods are often used for validation purposes (e.g. to make sure the property values do not violate a business rule). The same method that is called OnBeforeAdd is often also called OnBeforeUpdate, to perform the same validation.

- OnAfterAdd
  - Runs after an item is added to the database (through the add, create or merge actions), but before it is returned to the client.
  - OnAfterAdd methods can be used to synchronize with other items or with external systems (e.g. add a new part number to ERP).

- OnAdd
  - Runs in place of the built-in add action (via add, create or merge). Neither OnBeforeAdd nor OnAfterAdd events are called when using OnAdd.
  - An OnAdd method completely replaces the built-in add action, and would typically be used for federated items. The method is expected to create the appropriate records in the database and form a proper AML response. Failure to do either is likely to result in an error.

- OnBeforeUpdate
  - Runs before an item is updated in the database (through the update, edit or merge actions.)
  - OnBeforeUpdate methods are often used for validation purposes (often along with OnBeforeAdd). The request may either be rejected completely (by returning an error) or modified to conform to the proper rules.

- OnAfterUpdate
  - Runs after an item is updated in the database (through the update, edit or merge actions), but before it is returned to the client.
  - OnAfterUpdate methods can be used to synchronize with other items or with external systems (e.g. updating a part description in ERP).

- OnUpdate
  - Runs in place of the built-in update action (via update, edit or merge). Neither OnBeforeUpdate nor OnAfterUpdate events are called when using OnUpdate.
  - An OnUpdate method completely replaces the built-in update action, and would typically be used for federated items. The method is expected to modify the appropriate records in the database and form a proper AML response.

- OnBeforeDelete
  - Runs before an item is deleted (through the delete or purge actions.)
  - OnBeforeDelete methods are typically used to cancel a delete operation based on a business rule.

- OnAfterDelete
  - Runs after an item is deleted (through the delete or purge actions.)
  - OnAfterDelete methods would be used to synchronize with other items or with external systems (e.g. remove a record from ERP.)

- OnDelete
- Runs in place of the built-in delete action. Neither OnBeforeDelete nor OnAfterDelete events are called when using OnDelete.
- An OnDelete method completely replaces the built-in delete action, and would typically be used for federated items. The method is expected to remove the appropriate records in the database and form a proper response.

- **OnBeforeGet**
  - Runs before a search.
  - OnBeforeGet methods are typically used to add additional criteria to a search, based on business rules. For example, the method might find the default location of the user and add that location as criteria for the query.

- **OnAfterGet**
  - Runs after a search is executed, but before the results are returned.
  - OnAfterGet methods are commonly used to populate federated properties. This might involve performing calculations on other properties or extracting data from an external system. Once the value of the federated property is set, it appears to the client like any other property.

- **OnGet**
  - Runs in place of the built-in get action. Neither OnBeforeGet nor OnAfterGet events are called when using OnGet.
  - An OnGet method completely replaces the built-in get action, and would typically be used for federated items. The method is expected to retrieve the appropriate records in the database and form a proper AML response.

- **OnBeforeCopy**
  - Runs before an item is copied (via the copy action.)
  - An OnBeforeCopy method might be used to cancel a copy operation that violates a business rule.

- **OnAfterCopy**
  - Runs after an item is copied (via the copy action.)
  - OnAfterCopy methods can be used to set properties of the new item created by the copy.

- **OnBeforeLock**
  - Runs before an item is locked (via the lock or edit actions)
  - An OnBeforeLock method may be used to prevent an item from being locked based on business rules.

- **OnAfterLock**
  - Runs after an item is locked (via the lock or edit actions.)
  - OnAfterLock methods may be used to synchronize locks with other items.

- **OnBeforeUnlock**
  - Runs before an item is unlocked.
  - An OnBeforeUnlock method may be used to prevent an item from being unlocked based on business rules.
• OnAfterUnlock
  o Runs after an item is unlocked.
  o OnAfterUnlock methods may be used to synchronize locks with other items.

• OnBeforeVersion
  o Runs before an item is versioned (through the version, update, edit or merge actions.)
  o OnBeforeVersion methods are typically used to cancel a version operation based on a business rule.

• OnAfterVersion
  o Runs after an item is versioned (through the version, update, edit or merge actions.)
  o An OnAfterVersion method might be used to set properties of the new item version.

• OnBeforeMethod
  o Runs before Server Action Method.

• OnAfterMethod
  o Runs after Server Action Method.

• OnGetKeyedName
  o Runs when the system generates the keyed_name for an item.
  o Used to override the standard logic for generating keyed names.

4.5 Client Events

There are several Events available on the client side, which include:

• Form Events
• Field Events
• Grid Events
• Item Type Events
• Item Actions

4.5.1 Context Item

The this keyword context Object is an Item Object for Item Actions. However, the context Object is not the Item Object for Form, Field, and Grid Events. The this context Object is the browser document (DOM) Object for the Form and Grid Events and is the Field Object for Field Events.

The context Item Object for Form, Grid, and Field Events is the document.thisItem Object, which is an Item Object and should be used with the IOM API. For relationship grid events use parent.thisItem, which is a pointer to the document.thisItem Object.
4.5.2 Form Events

The Form Events are the HTML page events; for example, `onLoad`, `onUnload`, `onResize`, `onMouseDown`, `onMouseUp`, and others (refer to the ‘Form Events’ List in Aras Innovator for the complete list of available events.)

You bind your Method to the Form Event using the Form Tool. Select the Form Event tab and add the event relationships as shown below:

![Figure 1](image)

4.5.3 Field Events

The Field Events are the HTML field events; for example, `onSelect`, `onClick`, `onChange`, `onBlur`, `onFocus`, and others (refer to the ‘Field Events’ List in Aras Innovator for the complete list of available events.)

You bind your Method to the Field Event using the Form Tool. Select the Field by clicking on it in the canvas area in form Tool or from the Fields grid in the upper left hand corner of the Form Tool. Select the Field Event tab and add the event relationships as shown below:

![Figure 1](image)
4.5.4 Grid Events

Grid Events are the events for the grid control, which is used in the Relationships tab area for tear off Item windows. The grid events occur on the row (section 4.5.4.1) and on the cell (section 4.5.4.2).

Like Server Events you bind a Method as the callback for the event as the Grid Event relationship on the RelationshipType Item, and as the Grid Event relationship on the Property Item.

The Method gets at least three arguments: relationshipID, relatedID, gridApplet. The relationshipID is the ID for the relationship Item for the selected row. The relatedID is the ID for the related Item for the selected row. And the gridApplet is a handle to the grid control object. The relatedID maybe empty if there is no related Item for the relationship row. The relationshipID is also the ID for the grid control row.

Edit the RelationshipType Item and add Grid Events relationships as shown below:
4.5.4.1 Row Events

The row events include:

Table 5:

<table>
<thead>
<tr>
<th>Event</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>onSelectRow</td>
<td>Fires when the row is selected.</td>
</tr>
<tr>
<td>onInsertRow</td>
<td>Fires when the row is inserted.</td>
</tr>
<tr>
<td>onDeleteRow</td>
<td>Fires when the row is deleted.</td>
</tr>
</tbody>
</table>
The Method for the event is called with three arguments:

Table 6:

<table>
<thead>
<tr>
<th>Argument</th>
<th>Type</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>relationshipID</td>
<td>String</td>
<td>The ID for the relationship Item. This is also the selected row ID for the grid control.</td>
</tr>
<tr>
<td>relatedID</td>
<td>String</td>
<td>The ID for the related Item. The relatedID maybe empty if there is no related Item for the relationship row.</td>
</tr>
<tr>
<td>gridApplet</td>
<td>GridControl</td>
<td>The handle to the grid control.</td>
</tr>
</tbody>
</table>

4.5.4.2 Cell Events

Edit the Property Item and add Event relationships as shown below:

The cell events include:

Table 7:

<table>
<thead>
<tr>
<th>Event</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>onEditStart</td>
<td>Fires when the cell gets focus.</td>
</tr>
<tr>
<td>onEditFinish</td>
<td>Fires when the cell loses focus.</td>
</tr>
</tbody>
</table>
onChangeCell
Fires when the cell value changes.

Default Search

onSearchDialog

<table>
<thead>
<tr>
<th>Argument</th>
<th>Type</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>relationshipID</td>
<td>String</td>
<td>The ID for the relationship Item. This is also the selected row ID for the grid control.</td>
</tr>
<tr>
<td>relatedID</td>
<td>String</td>
<td>The ID for the related Item. The relatedID may be empty if there is no related Item for the relationship row.</td>
</tr>
<tr>
<td>gridApplet</td>
<td>GridControl</td>
<td>The handle to the grid control.</td>
</tr>
<tr>
<td>propertyName</td>
<td>String</td>
<td>The name of the Property for the cell column selected.</td>
</tr>
<tr>
<td>colNumber</td>
<td>Integer</td>
<td>The column position number in the grid</td>
</tr>
</tbody>
</table>

### 4.5.5 Item Type Events

Client Events that can be attached to an Item Type are triggered when user’s UI actions generate a new Item. These events are triggered from the client interface regardless of UI context on where in the GUI the new Item creation was initialized. These events would be triggered universally from the Main Menu, the TOC RMB menu, the Main Grid RMB menu, Relationship Grid, etc.

For Item Type new item creation, 3 events have been implemented. One event is triggered before a new Item is created; another event is triggered after an Item has been created; third event replaces the standard client ‘new Item’ logic.

- **onBeforeNew**: Method runs prior to a new Item creation. It has the ability to cancel subsequent client operations (i.e., form opening). It has ability to cancel creation of new Item.
  
  This event is often used to validate current conditions and determine if it is ok to create new Item.

- **onAfterNew**: Method runs after a new Item is created. Subsequent standard client logic is executed following method completion (i.e., form opening). Method is passed new Item.
  
  This event is often used to populate new item with data and open custom dialogs.

- **onNew**: The method replaces the standard ‘new Item’ client behavior.
  
  This event is used in special situations where solution must maintain full control over the new Item creation process.

**Note**: It is possible that both onBeforeNew and onAfterNew events to be assigned to the same Item Type and therefore executed sequentially.
4.5.6 Item Actions and Server Event

The Methods related to the ItemType via the ‘Item Action’ relationship are called via the action attribute and the Item.apply() method and can be reviewed by searching the ‘Item Actions’ Tab on the ItemType.

The Methods related to the ItemType via the ‘Server Event’ relationship are called by the server as pre and post event callbacks for the primitive server actions: add, update, delete, and get. And can be reviewed by searching the ‘Server Events’ Tab on the ItemType.

The Generic Methods can be reviewed by searching the Method Items.
5 Action Items

An Action Item is how Methods are bound to the client User Interface. Actions provide the hooks for invoking Methods from the Action menu bar choice or from the right mouse context popup menu. An Action is invoked on the client side but can call either a client or server side Method. In both cases the context Item must be defined.

The item_query Property on the Action Item is used to specify the query used to populate the context Item. This Property is of data_type="text" because it is actually an XSLT stylesheet. Simply put the item_query Action Property drives the content for the context Item for the Action Methods.

The use of a XSLT stylesheet for the item_query is consistent with how Aras Innovator sends out Email Notifications for Life Cycle promotions both on the State and on the Transition, on Workflow Activities, and in the Report Tool. The concept is the XSLT stylesheet is applied to the Item and the result is the AML query, which is used to get the context Item for the Method. This allows you to basically turn an Item into a query for the data you want as the context Item for the Method.

The default value for the item_query Action Property is:

```xml
<Item type="{@type}" id="{@id}" action="get" levels="0"/>
```

Note the use of the XSLT 'Attribute Substitution' for the type and id attributes.

If you want all your old actions, created with Innovator 6.1.5 or earlier, that expect relationships to work, use the following query string:

```xml
<Item type="{@type}" id="{@id}" action="get" levels="1"/>
```

The rules for how the content for the context Item are defined below for both client and server Methods.

5.1 Client Side Method Rules

- If has cache Item and is dirty then it is the context Item regardless if there is an item_query stylesheet value.
- If has cache Item and is not dirty and has item_query value then the stylesheet is applied against the cache Item and the result is the AML query to get the context Item for the Method.
- If has cache Item and is not dirty and no item_query value then the cache Item is the context Item for the Method.
- If no cache Item and no item_query value then the temporary Item with only the type and id attributes is the context Item for the Method.
- If no cache Item and has item_query value then a temporary Item is used containing only the Item tag with the type and id attributes. The stylesheet for the item_query is applied to the temporary Item and the result is used as the AML query for the content for the context Item for the Method.

5.2 Server Side Method Rules

- Currently the server side automatically gets the Item with levels="0" and ignores any extra Property tags passed from the client request. This needs to be changed in order to support more granular context Items and to pass in context Item via the client request.
- The Action needs to setup the Item for the server side Method request. This can range from the dirty Item from the client cache to only the <Item> tag with its type and id attributes plus the action attribute specifying the Method name to run.
To achieve backward compatibility with existing server side Method logic the context Item must be the Item from a server pre-GetItem call with levels="0". The server knows to do this when the same format for the AML we pass today is still passed, which is to put the ID for the Item as a Property in the request not as an attribute:

```xml
<Item type="ItemType Name" action="Method Name">
    <id>itemID</id>
</Item>
```

- The stylesheet for the item_query value would be the following, which constructs the AML format above:

```xml
<Item type="{@type}"<id><xsl:value-of select="@id"/></id></Item>
```

- If no cache Item and no item_query value then the temporary Item with the type attribute and the id is nested as a Property tag as shown above is passed as the request triggering the server to do the pre-GetItem levels="0" as today and the result is the context Item for the Method.

- If has cache Item and is dirty and no item_query value then passes the dirty Item, which is the content for the context Item for the server Method.

- If has item_query value but no cache Item then a temporary Item is used containing only the Item tag with the type and id attributes. Plus the doGetItem="1" attribute is included, which forces the server to do the pre-GetItem using this as its query criteria and its results is the content for the context Item for the server side Method.

- If has cache Item and is not dirty and has item_query value applies the stylesheet to the cached Item and pass that as the Item request. Plus the doGetItem="1" attribute is included, which forces the server to do the pre-GetItem using AML passed as the query criteria and the results is the content for the context Item for the server side Method.

### 5.3 Use Cases

#### 5.3.1 Client side - has cache Item is dirty

<table>
<thead>
<tr>
<th>Use Case Name:</th>
<th>Client side has cache Item is dirty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summary:</td>
<td>Invokes client side Item Method and the content for the context Item is the cached Item.</td>
</tr>
</tbody>
</table>
| Preconditions: | 1. That an Item is selected and the type and id for the selected Item is known by the client.  
2. That the ItemType for the selected Item has an "Item Action" RelationshipType and the Action type="item" and location="client". |
| Basic Course of Events: | 1. User selected an Item.  
2. Invokes the Action by context menu pick or menu bar Action menu pick. |
| Exception Paths: | |
## 5.3.2 Client side - no cache Item - no item_query value

Table 10:

<table>
<thead>
<tr>
<th>Use Case Name:</th>
<th>Client side no cache Item no item_query value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summary:</td>
<td>Invokes client side Item Method and the only criteria known is the type and id so the content for the context Item is only the Item tag with the type and id attributes.</td>
</tr>
</tbody>
</table>
| Preconditions:| 1. That an Item is selected and the type and id for the selected Item is known by the client.  
2. That the ItemType for the selected Item has an "Item Action" RelationshipType and the Action type="item" and location="client". |
| Basic Course of Events: | 1. User selected an Item.  
2. Invokes the Action by context menu pick or menu bar Action menu pick. |
| Exception Paths: | The type or id is unknown when the condition requires them to be known. |

## 5.3.3 Client side - has cache Item not dirty - no item_query value

Table 11:

<table>
<thead>
<tr>
<th>Use Case Name:</th>
<th>Client side has cache Item not dirty no item_query value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summary:</td>
<td>Invokes client side Item Method and the content for the context Item is cached Item.</td>
</tr>
</tbody>
</table>
| Preconditions:| 1. That an Item is selected and the type and id for the selected Item is known by the client.  
2. That the ItemType for the selected Item has an "Item Action" RelationshipType and the Action type="item" and location="client". |
| Basic Course of Events: | 1. User selected an Item.  
2. Invokes the Action by context menu pick or menu bar Action menu pick. |
| Exception Paths: | |
5.3.4 Client side - has cache Item not dirty - has item_query value

Table 12:

<table>
<thead>
<tr>
<th>Use Case Name:</th>
<th>Client side has cache Item not dirty has item_query value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summary:</td>
<td>Invokes client side Item Method and the content for the context Item is the result from a server request using the result of the XSLT transformation of the cached Item with the item_query stylesheet as the AML query server request.</td>
</tr>
</tbody>
</table>
| Preconditions:| 1. That an Item is selected and the type and id for the selected Item is known by the client.  
2. That the ItemType for the selected Item has an "Item Action" RelationshipType and the Action type="item" and location="client". |
| Basic Course of Events: | 1. User selected an Item.  
2. Invokes the Action by context menu pick or menu bar Action menu pick. |
| Exception Paths: | The item_query is not a valid XSLT stylesheet. |

5.3.5 Client side - no cache Item - has item_query value

Table 13:

<table>
<thead>
<tr>
<th>Use Case Name:</th>
<th>Client side no cache Item has item_query value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summary:</td>
<td>Invokes client side Item Method and the content for the context Item is the result from a server request using the result of the XSLT transformation of a temporary Item that only includes the type and id attributes with the item_query stylesheet as the AML query server request.</td>
</tr>
</tbody>
</table>
| Preconditions:| 1. That an Item is selected and the type and id for the selected Item is known by the client.  
2. That the ItemType for the selected Item has an "Item Action" RelationshipType and the Action type="item" and location="client". |
| Basic Course of Events: | 1. User selected an Item.  
2. Invokes the Action by context menu pick or menu bar Action menu pick. |
| Exception Paths: | 1. The type or id is unknown when the condition requires them to be known.  
2. The item_query is not a valid XSLT stylesheet. |
5.3.6 Server side - has cache Item is dirty

Table 14:

<table>
<thead>
<tr>
<th>Use Case Name:</th>
<th>Server side has cache Item and is dirty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summary:</td>
<td>Invokes server side Item Method and the content for the context Item is the cached Item passed as the request AML.</td>
</tr>
</tbody>
</table>
| Preconditions: | 1. That an Item is selected and the type and id for the selected Item is known by the client.  
2. That the ItemType for the selected Item has an "Item Action" RelationshipType and the Action type="item" and location="server". |
| Basic Course of Events: | 1. User selects an Item.  
2. Invokes the Action by context menu pick or menu bar Action menu pick. |
| Exception Paths: | |

5.3.7 Server side - no cache Item - no item_query value

Table 15:

<table>
<thead>
<tr>
<th>Use Case Name:</th>
<th>Server side no cache Item no item_query value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summary:</td>
<td>Invokes server side Item Method and the only criteria known is the type and id. The AML request is the nested id tag style we pass today, which tells the server to perform the pre-GetItem with levels=&quot;0&quot; and the result is the content for the context Item. This is the same as we currently do today.</td>
</tr>
</tbody>
</table>
| Preconditions: | 1. That an Item is selected and the type and id for the selected Item is known by the client.  
2. That the ItemType for the selected Item has an "Item Action" RelationshipType and the Action type="item" and location="server". |
| Basic Course of Events: | 1. User selects an Item.  
2. Invokes the Action by context menu pick or menu bar Action menu pick. |
| Exception Paths: | The type or id is unknown when the condition requires them to be known. |
5.3.8 Server side - has cache Item not dirty - no item_query value

Table 16:

<table>
<thead>
<tr>
<th>Use Case Name:</th>
<th>Server side has cache Item not dirty no item_query value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summary:</td>
<td>Invokes server side Item Method and the AML request is the nested id tag style we pass today, which tells the server to perform the pre-GetItem with levels=&quot;0&quot; and the result is the content for the context Item. This is the same as we currently do today.</td>
</tr>
</tbody>
</table>
| Preconditions:| 1. That an Item is selected and the type and id for the selected Item is known by the client.  
                             2. That the ItemType for the selected Item has an "Item Action" RelationshipType and the Action type="item" and location="client". |
| Basic Course of Events: | 1. User selects an Item.  
                             2. Invokes the Action by context menu pick or menu bar Action menu pick. |
| Exception Paths: | |

5.3.9 Server side - has cache Item not dirty - has item_query value

Table 17:

<table>
<thead>
<tr>
<th>Use Case Name:</th>
<th>Server side has cache Item not dirty has item_query value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summary:</td>
<td>Invokes server side Item Method and the content for the context Item is the result from a server pre-GetItem where the AML passed is the AML query, which is the result of the XSLT transformation of the cached Item with the item_query stylesheet; plus the doGetItem=&quot;1&quot; attribute is also set, which tells the server to do the pre-GetItem using the request AML as the query, the results is the content for the context Item.</td>
</tr>
</tbody>
</table>
| Preconditions:| 1. That an Item is selected and the type and id for the selected Item is known by the client.  
                             2. That the ItemType for the selected Item has an "Item Action" RelationshipType and the Action type="item" and location="server". |
| Basic Course of Events: | 1. User selects an Item.  
                             2. Invokes the Action by context menu pick or menu bar Action menu pick. |
| Exception Paths: | The item_query is not a valid XSLT stylesheet. |
5.3.10 Server side - no cache Item - has item_query value

Table 18:

<table>
<thead>
<tr>
<th>Use Case Name:</th>
<th>Server side no cache Item has item_query value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summary:</td>
<td>Invokes server side Item Method and the content for the context Item is the result from a server pre-GetItem where the AML passed is the AML query, which is the result of the XSLT transformation of a temporary Item that has only the Item tag with the type and id attributes with the item_query stylesheet; plus the doGetItem=&quot;1&quot; attribute is also set, which tells the server to do the pre-GetItem passing its results as the content for the context Item.</td>
</tr>
<tr>
<td>Preconditions:</td>
<td>1. That an Item is selected and the type and id for the selected Item is known by the client.</td>
</tr>
<tr>
<td>Basic Course of Events:</td>
<td>1. User selected an Item.</td>
</tr>
<tr>
<td>Exception Paths:</td>
<td>1. The type or id is unknown when the condition requires them to be known.</td>
</tr>
</tbody>
</table>
6 Aras Innovator Methodology

This section is a summary of the Aras Innovator Methodology. Following this methodology, helps you build better quality Aras Innovator business logic more quickly; plus it is easier to understand and maintain the code.

- The AML is the language that drives the Aras Innovator Server.
- AML documents contain Items, Structure, and Logic, so they are scripts.
- The Aras Innovator Server is a message based system in that it accepts AML scripts as messages and returns AML messages. AML document, AML script, AML message all mean the same thing.
- The IOM is the Object API used to build and apply AML messages.
- Methods implement business logic using the IOM API.
- Methods extend the Item Class when used as "Item Action" relationships on the ItemType, which simulates Object Oriented programming, where the ItemType is the Class and "Item Action" relationships to Methods are the Class methods.
- Methods are also generic arbitrary business logic that can be called like a sub routines from other Methods using the IOM Innovator.applyMethod(...) method.
- Methods follow the Item Factories design pattern; they should return a new Item and not side effect the context Item.
- Server Events are the exception because the purpose is to intercept and operate on the AML before the server parses it, and before the AML is returned to the client after the server parses it. So you do modify the context Item and return nothing.
- Implement changes/edits to the context Item in the OnBefore Event by altering the AML before the server parses it. Refrain from attempting to update the context Item after the server has already operated on it in the OnAfter Event. Use the OnAfter Events to update/include federated data in the response AML.
- Use the select, page, and pagesize attributes for the AML queries to optimize the performance for the request.
- Use the generic IOM methods to construct the AML queries rather than convenience methods like getItemBy, getRelationships(), or use the levels attribute because the convenience methods typically return far more data than required imposing a performance hit.
- The context Item is the keyword this Object for JavaScript and C#, and the Me Object for VB.Net.
- The context Item for Generic Methods is any XML you want but it is highly recommended that you continue to use AML to represent your data. This provides the benefit of using the IOM to manage the input for the Generic Methods.
- Attributes are used to pass control switches to the Method. You can invent your own because they are a simple way to pass meta-data to the Method.
7 Cookbook

This section is a Cookbook of recipes to help you solve common tasks while developing Methods. The examples are shown in JavaScript, C# and VB.Net when possible.

7.1 Create an Aras Innovator Object

You need an Innovator Object to return a `newResult()` or `newError()` Item.

Technique

There are basically two ways to create a new Innovator object; by getting the Innovator from the Item object or (only in JavaScript) calling the Class constructor.

JavaScript

```javascript
var myInnovator = new Innovator();
var myInnovator = this.getInnovator();
```

C#

```csharp
Innovator myInnovator = this.getInnovator();
```

VB.Net

```vbnet
Dim myInnovator As Innovator = Me.getInnovator()
```

7.2 Create an Item Object

You need an Item Object to submit a query or to add an Item.

Technique

There are basically two ways to create a new Item Object; by calling the factory methods on the Item object or Innovator object or (only in JavaScript) calling the Class constructor.

JavaScript

```javascript
var myItem = new Item();
var myItem = this.newItem(myType,myAction);
var myItem = myInnovator.newItem(myType,myAction);
var myResult = myInnovator.newResult(resultText);
var myError  = myInnovator.newError(errorMessage);
```

C#

```csharp
Item myItem = this.newItem(myType,myAction);
Item myItem = myInnovator.newItem(myType,myAction);
Item myResult = myInnovator.newResult(resultText);
Item myError  = myInnovator.newError(errorMessage);
```
7.3 Query for an Item

You want to query for an Item that you know by id and type.

Technique

There are a few ways to get an Item when you know its id and type, the simplest being the Innovator.getItemById() method. However, if you need to be granular about your request then building the query using the IOM is required. This provides the ability to include controls to limit the results and define the structure to be returned for the Items found.

JavaScript

```javascript
var qryItem = this.newItem(myType,"get");
qryItem.setID(myId);
var results = qryItem.apply();

var myInnovator = this.getInnovator();
var results = myInnovator.getItemById(myType, myId);
```

C#

```csharp
Item qryItem = this.newItem(myType,"get");
qryItem.setID(myId);
Item results = qryItem.apply();

Innovator myInnovator = this.getInnovator();
Item results = myInnovator.GetItemById(myType, myId);
```

VB.Net

```vbnet
Dim qryItem As Item = Me.NewItem(myType,"get")
qryItem.setID(myId)
Dim results As Item = qryItem.Apply()

Dim myInnovator As Innovator = Me.getInnovator()
Dim results As Item = myInnovator.GetItemById(myType, myId)
```
7.4 Query and iterate over a set of Items

You want to query for the Items that match some criteria and generate an HTML Table as the results.

**Technique**

There is no difference in setting up a query for a single Item or for many. Only the criteria define the set size returned. In this recipe you create an Item and populate the query criteria, apply it, and iterating over the Items returned producing a HTML `<TABLE>` fragment.

**JavaScript**

```javascript
var qryItem = this.newItem("Part","get");
qryItem.setAttribute("select","item_number,description,cost");
qryItem.setProperty("cost", "100");
qryItem.setPropertyCondition("cost", "gt");
var results = qryItem.apply();
var count = results.getItemCount();
var content = "<table>";
for (var i=0; i<count; ++i) {
    var item = results.getItemByIndex(i);
    content += "" +
        "<tr>" +
        "<td>" + item.getProperty("item_number") + "</td>" +
        "<td>" + item.getProperty("description") + "</td>" +
        "<td>" + item.getProperty("cost") + "</td>" +
        "</tr>";
}
content += "</table>";
return content;
```

**C#**

```csharp
Item qryItem = this.newItem("Part","get");
qryItem.setAttribute("select","item_number,description,cost");
qryItem.setProperty("cost", "100");
qryItem.setPropertyCondition("cost", "gt");
Item results = qryItem.apply();
int count = results.getItemCount();
int i;
string content = "<table>";
for (i=0; i<count; ++i) {
    Item item = results.getItemByIndex(i);
    content += "" +
        "<tr>" +
        "<td>" + item.getProperty("item_number") + "</td>" +
        "<td>" + item.getProperty("description") + "</td>" +
        "<td>" + item.getProperty("cost") + "</td>" +
        "</tr>";
}
content += "</table>";
Innovator innovator = this.getInnovator();
return innovator.newResult(content);
```
VB.Net

Dim qryItem As Item = MeNewItem("Part","get")
qryItem.SetAttribute("select","item_number,description,cost")
qryItem.SetProperty("cost", "100")
qryItem.SetPropertyCondition("cost", "gt")
Dim results As Item = qryItem.Apply()
Dim count As Integer = results.GetItemCount()
Dim i As Integer
Dim content As String = "<table>
For i=0 to count - 1
    Dim item As Item = results.GetItemByIndex(i)
    content += "" +
        "<tr>" +
        "<td>" + item.GetProperty("item_number") + "</td>" +
        "<td>" + item.GetProperty("description") + "</td>" +
        "<td>" + item.GetProperty("cost") + "</td>" +
    "</tr>"
Next
content += "</table>"
Dim innovator As Innovator = Me.getInnovator()
return innovator.NewResult(content)

7.5 Query for an Item and return its configuration

You want to query for an Item and return its configuration in the results.

Technique

To query for an Item and retrieve its structure you build the query as the structure you want returned. Use the IOM methods to add the relationships you want and build the structure in the Item. The server returns the structure that follows the request structure.

This recipe illustrates several related concepts together, which are how to get a set of Items from an Item and how to iterate over the set, plus how to get the related Item from the relationship Item.

JavaScript

var innovator = this.getInnovator();

// Set up the query Item.
var qryItem = this.newItem("Part","get");
qryItem.setAttribute("select","item_number,description,cost");
qryItem.setID(myId);

// Add the BOM structure.
var bomItem = this.newItem("Part BOM","get");
bomItem.setAttribute("select","quantity,related_id(item_number,description,co st)");
qryItem.addRelationship(bomItem);

// Perform the query.
var results = qryItem.apply();

// Test for an error.
if (results.isError()) {
    top.aras.AlertError("Item not found: " + results.getErrorDetail());
    return;
}

// Get a handle to the BOM Items.
var bomItems = results.getRelationships();
var count = bomItems.getItemCount();

// Create the results content.
var content = "<table border='1'>" +
               "<tr>
                 <td>Part Number</td>
                 <td>Description</td>
                 <td>Cost</td>
                 <td>Quantity</td>
               </tr>
               
               // Iterate over the BOM Items.
               for (var i=0; i<count; ++i) {
                 // Get a handle to the relationship Item by index.
                 var bom = bomItems.getItemByIndex(i);
                 // Get a handle to the related Item for this relationship Item.
                 var bomPart = bom.getRelatedItem();

                 content += "<tr>
                           <td>" + bomPart.getProperty("item_number") + 
                           "</td>
                           <td>" + bomPart.getProperty("description") + 
                           "</td>
                           <td>" + bomPart.getProperty("cost") + 
                           "</td>
                           <td>" + bom.getProperty("quantity") + 
                           "</td>
                           
               }
return content + "</table>";

C#

Innovator innovator = this.getInnovator();

// Set up the query Item.
Item qryItem = this.newItem("Part","get");
qryItem.setAttribute("select","item_number,description,cost");
qryItem.setID(myId);

// Add the BOM structure.
Item bomItem = this.newItem("Part BOM","get");
bomItem.setAttribute("select","quantity,related_id(item_number,description,cost)");
qryItem.addRelationship(bomItem);

// Perform the query.
Item results = qryItem.apply();

// Test for an error.
if (results.isError()) {
    return innovator.newError("Item not found: " + results.getErrorDetail());
}
// Get a handle to the BOM Items.
Item bomItems = results.getRelationships();
int count = bomItems.getItemCount();
int i;

// Create the results content.
string content = "<table border='1'>" +
    "<tr>" +
    "<td>Part Number</td>" +
    "<td>Description</td>" +
    "<td>Cost</td>" +
    "<td>Quantity</td>" +
    "</tr>";

// Iterate over the BOM Items.
for (i=0; i<count; ++i)
{
    // Get a handle to the relationship Item by index.
    Item bom = bomItems.getItemByIndex(i);
    // Get a handle to the related Item for this relationship Item.
    Item bomPart = bom.getRelatedItem();

    content += "" +
        "<tr>" +
        "<td>" + bomPart.getProperty("item_number") + "</td>" +
        "<td>" + bomPart.getProperty("description") + "</td>" +
        "<td>" + bomPart.getProperty("cost") + "</td>" +
        "<td>" + bom.getProperty("quantity") + "</td>" +
        "</tr>";
}
content += "</table>";

return innovator.newResult(content);

**VB.Net**

Dim innovator As Innovator = Me.getInnovator()

' Set up the query Item.
Dim qryItem As Item = Me.newItem("Part","get")
qryItem.setAttribute("select","item_number,description,cost")
qryItem.setID(myId)

' Add the BOM structure.
Dim bomItem As Item = Me.newItem("Part BOM","get")
bomItem.setAttribute("select","quantity,related_id(item_number,description,cost)")
qryItem.addRelationship(bomItem)

' Perform the query.
Dim results As Item = qryItem.apply()

' Test for an error.
If results.isError() Then
    Return innovator.newError(results.getErrorDetail())
End If
' Get a handle to the BOM Items.
Dim bomItems As Item = results.getRelationships()
Dim count As Integer = bomItems.getItemCount()
Dim i As Integer

' Create the results content.
Dim content As String = "<table border='1'>" + _
"<tr>" + _
"<td>Part Number</td>" + _
"<td>Description</td>" + _
"<td>Cost</td>" + _
"<td>Quantity</td>" + _
"</tr>"

' Iterate over the BOM Items
For i = 0 To count - 1
' Get a handle to the relationship Item by index.
Dim bom As Item = bomItems.GetItemByIndex(i)

' Get a handle to the related Item for this relationship Item.
Dim bomPart As Item = bom.getRelatedItem()

content += _
"<tr>" + _
"<td>" + bomPart.getProperty("item_number") + "</td>" + _
"<td>" + bomPart.getProperty("description") + "</td>" + _
"<td>" + bomPart.getProperty("cost") + "</td>" + _
"<td>" + bom.getProperty("quantity") + "</td>" + _
"</tr>"
Next
content += "</table>"

Return innovator.newResult(content)
7.6 Query using AML to construct the query

You want to perform a query using the AML to construct the query criteria.

**Technique**

Create an Item Object but use the `Item.loadAML()` method to populate the Item.

**JavaScript**

```javascript
var innovator = new Innovator();
var qryItem = innovator.newItem();
qryItem.loadAML(
    "<Item type='Part' action='get' select='item_number,description,cost'>" +
    "<item_number condition='like'>1%</item_number>" +
    "<Relationships>" +
    "<Item type='Part BOM' action='get' select='quantity'>" +
    "<quantity condition='gt'>1</quantity>" +
    "</Item>" +
    "</Relationships>" +
    "</Item>"
);

var resultItem = qryItem.apply();
if (resultItem.isError()) {
    top.aras.AlertError("Item not found: " + resultItem.getErrorDetail());
    return;
}

var count = resultItem.getItemCount();
for (i=0; i<count; ++i) {
    var item = resultItem.getItemByIndex(i);
}
```

7.7 Query for the Item next promotion states

You want to get the next promotion states for an Item and use the states as the choices for a dropdown control.

**Technique**

Use the item action `getItemNextStates` to get the next state values. This recipe assumes there is a select input field on the form for us to populate with state values.

**HTML**

```html
<select id="mySelect"></select>
```

**JavaScript**

```javascript
var results = document.thisItem.apply("getItemNextStates");
var nextState = results.getItemsByXPath('//Item[@type="Life Cycle State"]');
var count = nextState.getItemCount();

var oSelect = document.getElementById('mySelect');
for (var i=0; i<count; ++i) {
```
var item = nextStates.getItemByIndex(i);
var opt  = document.createElement('option');
opt.text = item.getProperty('name');
oSelect.add(opt);
}

7.8 Query using relationships as search criteria

You want to search for an Item using the relationship and related Items as search criteria. In this recipe, we get the User Item that matches the Identity name as an Alias relationship to the User Item.

Technique

The following are some key points to understand when constructing an AML query:

1. Use the get action on the relationship Items to include it as search criteria.
   a. Without the get action the relationship Item is ignored as search criteria.
   b. The relationship Items are also returned. Currently there is no way to use relationships as search criteria and not return them in the results, as you can with the related Item described below.

2. Include the related_id property name in the select attribute for the relationship Item if you want to return the related Item nested inside the related_id property in the results.

   <Item type="Part BOM" select="quantity,related_id"/>
   Use () to include the select attribute value for the related Item inside the select attribute for the relationship Item.

   <Item type="Part BOM" select="quantity,related_id(item_number,description)"/>

3. The select attribute for the nested Item tag for the related_id property has higher precedence over the select value inside the () for the relationship's select attribute.

4. The get action is not required for the nested Item tag for the related_id property to include it as search criteria.

These two AML scripts are equivalent queries for selecting the name property for the related Item:

<Item type="User" action="get" select="first_name,last_name,email">
   <Relationships>
      <Item type="alias" action="get" select="related_id(name)"/>
   </Relationships>
</Item>

<Item type="User" action="get" select="first_name,last_name,email">
   <Relationships>
      <Item type="alias" action="get" select="related_id">
         <related_id>
            <Item type="Identity" action="get" select="name"/>
         </related_id>
      </Item>
   </Relationships>
</Item>

Clearly the first example is simpler and requires less coding (referring to the IOM logic that would construct the AML) and is the recommended style when all you require is specifying a select for the related Item for the query.

But the second style opens the opportunity to now include additional search criteria for the related Item.
AML

```xml
<Item type="User" action="get" select="first_name, last_name, email">
  <Relationships>
    <Item type="Alias" action="get" select="related_id">
      <!--
      This get will limit root Items to only those that match the relationship criteria.
      The get action is required otherwise the criteria are ignored.
      To include the nested Item tag for the related id include the property name in the select attribute for the relationship Item.
      Can include the select attribute value for the related Item inside () i.e. related_id(name)
      -->
      <related_id>
        <Item type="Identity" action="get" select="keyed_name">
          <!--
          This get has no effect and the search will work with or without it.
          It is recommended that you include it because the AML parser may be stricter in the future.
          The select attribute over rules the parent relationships select.
          -->
          <name>Larry Bird</name>
        </Item>
      </related_id>
    </Item>
  </Relationships>
</Item>
```

JavaScript

```javascript
var innovator = new Innovator();
var qry = innovator.newItem("User","get");
qry.setAttribute("select","first_name, last_name, email");

var alias = new Item("Alias","get");
alias.setAttribute("select","related_id");

var identity = new Item("Identity","get");
identity.setAttribute("select","name");
identity.setProperty("name", "Larry Bird");

alias.setRelatedItem(identity);
qry.addRelationship(alias);

var results = qry.apply();
if (results.isError()) {
  top aras.AlertError(results.getErrorDetail());
  return;
}
```
7.9 Add an Item configuration in one transaction

You want to add an Item configuration like a BOM as one transaction.

**Technique**

Adding an Item configuration is done by building the Item structure using the IOM methods.

**JavaScript**

```javascript
var innovator = new Innovator();
var partItem = innovator.newItem("Part","add");
partItem.setProperty("item_number", "123-456");
partItem.setProperty("description", "Blah blah");

var bomItem = new Item("Part BOM","add");
bomItem.setProperty("quantity", "10");

var relatedItem = new Item("Part","get");
relatedItem.setProperty("item_number", "555-555");

bomItem.setRelatedItem(relatedItem);
partItem.addRelationship(bomItem);

var resultItem = partItem.apply();
if (resultItem.isError()) {
    top.aras.AlertError(resultItem.getErrorDetail());
    return;
}
```

**Technique**

The following is the same thing but uses the Item.loadAML() method to populate the Item Object with AML text.

**JavaScript**

```javascript
var innovator = new Innovator();
var partItem = innovator.newItem();
partItem.loadAML("<Item type='Part' action='add'>" +
    "<item_number>123-456</item_number>" +
    "<description>Blah blah</description>" +
    "<Relationships>" +
    "<Item type='Part BOM' action='add'>" +
    "<quantity>10</quantity>" +
    "<related_id>" +
    "<Item type='Part' action='get'>" +
    "<item_number>555-555</item_number>" +
    "</Item>" +
    "</related_id>" +
    "</Relationships>" +
    "</Item>");

var resultItem = partItem.apply();
```
if (resultItem.isError()) {
    top aras.AlertError (resultItem.getErrorDetail());
    return;
}

7.10 Add a Named Permission

You want to add a new named Permission Item.

Technique

Use the Item Class Extended Method set to add a new Named Permission Item.

JavaScript

var innovator = new Innovator();
var permItem = innovator.newItem("Permission", "add");
permItem.setProperty("name", "AK Part Permissions");
setIdentityAccess (permItem, "All Employees", "get", true);
setIdentityAccess (permItem, "CM", "get", true);
setIdentityAccess (permItem, "CM", "update", true);
setIdentityAccess (permItem, "CM", "delete", true);
resultItem = permItem.apply();
if (resultItem.isError()) {
    top aras.AlertError (resultItem.getErrorDetail());
    return;
}

function setIdentityAccess (item, identityName, permType, accessState) {
    var identity = item.newItem();
    identity.setType("Identity");
    identity.setAction("get");
    identity.setProperty("name", identityName);
    var access = item.newItem("Access", "add");
    access.setProperty("can_" + permType, (accessState ? "1" : "0"));
    access.setRelatedItem (identity);
    item.addRelationship (access);
}

7.11 Set a Private Permission for an Item

You want to set a new private Permission for an Item.

Technique

Use the Item Class Extended Method set to set a new private Permission for an Item.

JavaScript

// Set up the Part query
var innovator = new Innovator();
var qryItem = innovator.newItem("Part", "get");
qryItem.setAttribute("select", "id,permission_id");
qryItem.setAttribute("expand", "1");
```javascript
qryItem.setAttribute("levels", "1");
qryItem.setPropertyCondition("item_number", "like");
qryItem.setProperty("item_number", "123%");

// Run the query and check for errors
var resultItem = qryItem.apply();
if (resultItem.isError()) {
    top.aras.AlertError(resultItem.getErrorDetail());
    return;
}

// Iterate over the Items returned and add the private permissions for each.
var count = resultItem.getItemCount();
for (i=0; i<count; ++i) {
    var item = resultItem.getItemByIndex(i);
    var permItem = item.getPropertyItem("permission_id");

    // Remove existing permissions first
    var accesses = permItem.getRelationships("Access");
    for (i=0; i<accesses.getItemCount(); i++) {
        var access = accesses.getItemByIndex(i);
        access.setAction("delete");
    }

    permItem.setProperty("name", permItem.getID());
    setIdentityAccess(permItem, "Component Engineering", "get", true);
    setIdentityAccess(permItem, "CM", "get", true);
    setIdentityAccess(permItem, "CM", "update", true);

    // Grant access to the current user's alias identity
    var myAlias = innovator.newItem("Alias", "get");
    myAlias.setProperty("source_id", inn.getUserID());
    myAlias = myAlias.apply();
    var aliasId = myAlias.getItemByIndex(0).getProperty("related_id");
    var aliasName = innovator.getItemById("Identity", aliasId).getProperty("name");
    setIdentityAccess(permItem, aliasName, "get", true);

    item.setAction("edit");
    resultItem = item.apply();
    if (resultItem.isError()) {
        top.aras.AlertError(resultItem.getErrorDetail());
    }
}

function setIdentityAccess(item, identityName, permType, accessState) {
    var identity = item.newItem();
    identity.setType("Identity");
    identity.setAction("get");
    identity.setProperty("name", identityName);
    var access = item.newItem("Access", "add");
    access.setProperty("can_"+permType, (accessState ? "1" : "0");
    access.setRelatedItem(identity);
    item.addRelationship(access);
}
```
7.12 Apply a Generic Method

You want to write Generic Methods that can be used as subroutines for other Methods.

Technique

Use the `Innovator.applyMethod()` method to apply Generic Methods. The following examples assume a server-side method named "Reverse String" exists, and that it returns a result item containing the reversed contents of the `<string>` tag.

JavaScript

```javascript
var inn = this.getInnovator();
var results = inn.applyMethod("Reverse String", "<string>abc</string>";)
return results.getResult(); // returns "cba"
```

C#

```csharp
Innovator inn = this.getInnovator();
Item results = inn.applyMethod("Reverse String", "<string>abc</string>";)
// Return a result item with "cba" as the contents of the Result tag
return inn.newResult(results.getResult());
```

VB.Net

```vbnet
Dim inn As Innovator = Me.getInnovator()
Dim results As Item = inn.applyMethod("Reverse String", "<string>abc</string>")
' Return a result item With "cba" As the contents of the Result tag
Return inn.newResult(results.getResult())
```

7.13 Need to Save text to a File

You want to save text to a file.

Technique

Use the File and StreamWriter namespaces to write to a text file.

C#

```csharp
Innovator myInnovator = this.getInnovator();
string path = CCO.Server.MapPath("temp/yoyo.txt");
try
{
    if (File.Exists(path)) File.Delete(path);
    StreamWriter sw = File.CreateText(path);
    sw.Write(this.dom.InnerXml);
    sw.Close();
}
catch (Exception e)
{
    return myInnovator.newError(e.Message);
}
return myInnovator.newResult("ok");
```
### 7.14 Need to Send Email from a Method

You want to send an Email message from either server or client side Method.

**Technique**

Use `Aras.IOM.Item.email(mail_item, idnt_item)` method to send email to a particular Innovator's identity.

| Note: | Innovator's identity could be a group of people in which case the email is sent to all of them. |

**C#**

```csharp
...
// It’s assumed here that required identity (item of type ‘Identity’) // has already obtained (see other examples on how to perform ‘get’ // requests to Innovator server using IOM). Same about item of type // ‘User’ that represents the person who sends the email (‘fromUser’).
Item idnt = ...
Item fromUser = ...

// It’s assumed in the sample that this represents an item of // type Part. ${Item/item_number} in the email message is a parameter // that represents the XPath to the property item_number of // item of type Part; this parameter will be substituted on // this.item_number before the email is sent. Note that both // subject and body of the email item could be parameterized. // This mechanism allows to created parameterized email templates // (items of type “Email Message”) that could be saved // in Innovator and used for sending emails with concrete content // when required.
string subject = "Part promotion notification";
string body = @"The part ${Item/item_number} has been promoted";

// In this particular example instead of getting a ready template // email from the server a new item of type “EMail Message” is created
Item email_msg = this.newItem("EMail Message");

email_msg.setProperty("subject", subject);
email_msg.setProperty("body_plain", body);
email_msg.setPropertyItem("from_user", fromUser);

// Finally send the email
if( this.email( email_msg, idnt ) == false )
{
    // Error handling
    ...
}
```
7.15 Need to Add an UI Control

You want to add one of new DOJO controls to a page.

**Technique**

In HTML code use the DOJO control name (e.g. GridContainer in the code sample below), the special `<td>` tag and appropriate control event handlers to run the control on the page. Make sure that all the event handlers for the control are placed in HTML code above the `<td>` tag:

**HTML Code**

```html
<script type="text/javascript"
src="../javascript/include.aspx?classes=ScriptSet2"></script>
<script type="text/javascript"
src="../javascript/include.aspx?classes=XmlDocument"></script>
<script type="text/javascript"
src="../javascript/include.aspx?classes=/dojo.js"
  data-dojo-config="isDebug: false, parseOnLoad: false, baseUrl:'../javascript/dojo'"></script>
<script>
var gridControl = null;
var gridXML = '' +
'  <table>' +
'    <thead>' +
'      <th align="c">Name</th>' +
'    </thead>' +
'    <columns>' +
'      <column width="130" order="0" />' +
'    </columns>' +
'    <tr>' +
'      <td>Test</td>' +
'    </tr>' +
'  </table>';
window.addEventListener("DOMContentLoaded", function () {
    gridControl = grid = control;
    clientControlsFactory.on(grid, {
      "gridClick": onClick,
      "gridKeyPress": onKeyPressed,
      "gridEditCell": OnEditCell,
      "gridMenuClick": onMenuClick,
      "gridMenuInit": InitMenu,
      "gridDoubleClick": onDoubleClick
    });
    gridControl.Delimeter="|";
    gridControl.InitXML(gridXML);
```

©2015 Aras Corporation All Copyrights Reserved.
function onClick(row, col)
{
    return;
}
function onKeyPressed(kEv)
{
    return;
}
function OnEditCell(event, row, col)
{
    return;
}
function onMenuClick(menuChoice)
{
    return;
}
function InitMenu(row, col)
{
    return;
}
function onDoubleClick(rId)
{
    return;
}
</script>
<table>
<tr>
    <td style="width:300px; height: 300px;" valign="top" id="gridTD">
    </td></tr>
</table>
7.16 Need for Speed ApplySQL

You want to query the DB directly bypassing Innovator logic to get the data faster.

**Technique**

Use the `Innovator.applySQL(...)` method to submit SQL direct to the database. The format of the xml returned by the `Innovator.applySQL(...)` where passed SQL statement is a ‘select’ statement is the following:

```xml
<SOAP-ENV:Envelope xmlns:SOAP-ENV=...>
  <SOAP-ENV:Body>
    <ApplySQLResponse>
      <Item>
        <A>aval</A>
        <B>bval</B>
        ...
      </Item>
      ...
    </ApplySQLResponse>
  </SOAP-ENV:Body>
</SOAP-ENV:Envelope>
```

In case executed SQL statement doesn’t return a record set (e.g. `update [table] ...`), the returned AML either contains a `<Fault>` if SQL statement failed or looks like this:

```xml
<SOAP-ENV:Envelope xmlns:SOAP-ENV=...>
  <SOAP-ENV:Body>
    <ApplySQLResponse>
      OK
    </ApplySQLResponse>
  </SOAP-ENV:Body>
</SOAP-ENV:Envelope>
```

This recipe returns the XML from the `applySQL()` method and forms HTML for a table to display the data.

**C#**

```csharp
Innovator myInnovator = this.getInnovator();
Item results = myInnovator.applySQL(
    "select login_name,first_name,last_name,email " +
    "from [user] " +
    "order by last_name,first_name");

string content = "" +
    "<style type='text/css'>" +
    "table {background:#000000;}" +
    "th {font:bold 10pt Verdana; background:#0000FF; color:#FFFFFF;}" +
    "td {font:normal 10pt Verdana; background:#FFFFFF;}" +
    "caption {font:bold 14pt Verdana; text-align:left;}" +
    "</style>" +
    "<table id='tbl' border='0' cellspacing='1' cellpadding='2'
     data-src="#itemData">" +
    "<caption>User Directory</caption>" +
    "<thead>
```

"\t<tr>" +
  "\t<th>Login Name</th>" +
  "\t<th>First Name</th>" +
  "\t<th>Last Name</th>" +
  "\t<th>EMail</th>" +
"\t</tr>" +
"\t</thead>" +
"\t</tbody>";

int ucount = results.getItemCount();
for (int i=0; i<ucount; i++) {
  Item user = results.getItemByIndex( i );
  content += "\t<tr><td>" + user.getProperty( "login_name", "" ) + "</td>";
  content += "\t<td>" + user.getProperty( "first_name", "" ) + "</td>";
  content += "\t<td>" + user.getProperty( "last_name", "" ) + "</td>";
  content += "\t<td>" + user.getProperty( "email", "" ) + "</td></tr>";
}

content += "" +
  "\t</tbody>" +
  "\t</table>";

return myInnovator.newResult(content);

7.17 Need a callback for a Relationships Grid Row Event

You want to call a client side Method when the Relationships Grid row is selected to deselect the row if it is not a new relationship row.

Technique

Add the Grid Event relationship to a Method as the callback for the OnSelectRow event.

![Figure 6.](image-url)
The Method gets three arguments: relationshipID, relatedID and gridApplet. The relationshipID is the ID for the relationship Item for the selected row. The relatedID is the ID for the related Item for the selected row. The gridApplet is a handle to the grid control object.

The relationshipID is also the ID for the grid control row. This recipe calls the gridApplet Deselect() method if the relationship Item for the selected row if the relationship has not been modified.

**JavaScript**

```javascript
// The row ID is the same as the relationship ID
var rowId = gridApplet.getSelectedId();

// Find the relationship item and exit if it's not found
var thisItem = parent.thisItem;
var xpath = "Relationships/Item[@id='" + rowId + "]";
var relItem = thisItem.getItemsByXPath(xpath);
if (relItem.getItemCount() == 1) {
    relItem = relItem.getItemByIndex(0);
} else {
    return;
}

// Check the isDirty attribute to see if the relationship has been modified
var isDirty = (relItem.getAttribute("isDirty") == "1");
if (!isDirty) { gridApplet.Deselect(); }
```

### 7.18 Need a callback for a Relationships Grid Cell Event

You want to call a client side Method when the Relationships Grid cell is selected to blur the cell and prevent editing the cell value.

**Technique**

Add the Event relationship to a Property as the callback for the OnEditCell event.

![Figure 7](attachment:image-url)
The Method gets five arguments: relationshipID, relatedID, propertyName, colNumber, gridApplet. The propertyName is the name of the Property for the cell column selected, and colNumber is the column position number in the grid.

Simple return false and this blurs the grid cell.

**JavaScript**

```javascript
// Get the current value of the cell
var cellValue = gridApplet.GetCellValue(relationshipID, colNumber);

// If the cell already has a value, disallow editing
if (cellValue !== "") {
    return false;
}
```

### 7.19 Show relationships in a Grid control on the Form

You want to show the relationships for the context Item in a Grid control on the Item Form.

**Technique**

Add an HTML Field (positioned at Point (300,10) in the code sample below) and insert an HTML code than defines the `<div>` tag to hold the dynamically populated grid and the JavaScript to get the populating grid relationships.

**HTML Field code**

```html
<div id="gridTD" style="width: 400px; height: 500px;"></div>
<script type="text/javascript">
    var myCount = 0;
    var gridControl;
r", {id: "grid", connectId: "gridTD", canEdit_Experimental: function () {
        return false; }}), function(control){
        gridControl = control;
        clientControlsFactory.on(gridControl, {
            "gridClick": function (rowID, column) {
                alert("rowId:" + rowID + ", col:" + column);
            }
        });
    fillGrid();
};

function fillGrid() {
    var item = document[thisItem];
    // Get the relationships
    var qry = item.newItem("Part BOM", "get");
    qry.setAttribute("select", "quantity,related_id(item_number,name,cost)");
    qry.setProperty("source_id", item.getID());
    var results = qry.apply();
    if (results.getItemCount() < 0) {
        top.aras.AlertError(results.getErrorDetail());
        return;
    }
    // Populate the grid with the results.
    populateGrid(item, results);
```
function populateGrid(item, results) {
  var propNameArr = new Array("item_number", "name", "cost");
  var gridXml =
    "<table editable='false' draw_grid='true'>" +
    "<columns>" +
    "<column width='30%' order='0' align='left' />" +
    "<column width='40%' order='1' align='left' />" +
    "<column width='15%' order='2' align='right' />" +
    "<column width='15%' order='3' align='right' />" +
    "</columns>" +
    "<thead>" +
    "<th>Part Number</th>" +
    "<th>Name</th>" +
    "<th>Cost</th>" +
    "<th>Quantity</th>" +
    "</thead>" +
    "</table>";
  var inn = item.getInnovator();
  var gridDom = inn.newXMLDocument();
  gridDom.loadXML(gridXml);
  var tableNd = gridDom.selectSingleNode("/table");
  var c = results.getItemCount();
  for (var i=0; i<c; ++i) {
    var bom = results.getItemByIndex(i);
    var part = bom.getRelatedItem();
    var trNd = gridDom.createElement("tr");
    trNd.setAttribute("id", bom.getID());
    var tdNd;
    for (var j=0; j<propNameArr.length; j++) {
      tdNd = gridDom.createElement("td");
      tdNd.text = part.getProperty(propNameArr[j]);
      trNd.appendChild(tdNd);
    }
    tdNd = gridDom.createElement("td");
    tdNd.text = bom.getProperty("quantity");
    trNd.appendChild(tdNd);
    tableNd.appendChild(trNd);
  }
  gridControl.InitXML(gridDom.xml);
} <script>
7.20 Open the relationships in an Excel Document

You want to open the relationships for the context Item in an Excel document outside the Form.

Technique

Using the Form Tool we add an HTML Field to the Form, which we use to insert the HTML and JavaScript code for displaying the Excel document for the "My BOM" relationships for the document.thisItem context Part Item.

Add a HTML Field and insert the following code, which defines a <button> tag to call the JavaScript code to get the relationships to populate the control.

| Note: The use of Excel automation is heavily dependent on the client security settings, and may not work in all environments. |
| Note: The use of the ActiveX object is only supported in Internet Explorer |

HTML Field code

```html
<button onclick="openExcel()">Open Excel Document</button>
<script language="JavaScript">
function MyOnloadHandler() {
    if (!document.thisItem) { return; }
    var item = document.thisItem;
    var qry = item.newItem('Part BOM','get');
    qry.setAttribute('select','quantity,related_id(item_number,name,cost)');
    qry.setProperty('source_id', item.getID());
    top.results = qry.apply();
}

function openExcel() {
    if (! document.thisItem) return;
    var item = document.thisItem

    var excel = new ActiveXObject("Excel.Application");
    excel.Visible = true;
    var workbook = excel.Workbooks.Add();
    var sheet = workbook.ActiveSheet;

    // Add the context Item to the Excel sheet.
    sheet.Cells(1,1).Value = "Part Number";
    sheet.Cells(2,1).Value = "Description";
    sheet.Cells(3,1).Value = "Cost";
    sheet.Cells(1,2).Value = item.getProperty('item_number');
    sheet.Cells(2,2).Value = item.getProperty('name');
    sheet.Cells(3,2).Value = item.getProperty('cost');
    populateExcel(item, top.results, sheet, 5);
}

function populateExcel(item, results, sheet, row) {
    sheet.Cells(row,1).Value = "Part Number";
    sheet.Cells(row,2).Value = "Description";
    sheet.Cells(row,3).Value = "Cost";
    sheet.Cells(row++,4).Value = "Quantity";

    var c = results.getItemCount();
    for (var i=0; i<c; ++i) {
```
var bom = results.getItemByIndex(i);
var part = bom.getRelatedItem();

sheet.Cells(i+row,1).Value = part.getProperty('item_number');
sheet.Cells(i+row,2).Value = part.getProperty('name');
sheet.Cells(i+row,3).Value = part.getProperty('cost');
sheet.Cells(i+row,4).Value = bom.getProperty('quantity');
}
sheet.Range("A1:D1").EntireColumn.AutoFit();
}
window.attachEvent("onload", MyOnloadHandler);
</script>

### 7.21 Want the Identities for the User

You want to get the Identity ID's for the User.

**Technique**

Use the classic Aras Innovator API `top.aras.getIdentityList()` method, which returns a comma delimited string of ID's.

| Note: | The classic API will eventually be eliminated and this method will become available on the IOM Innovator object as `Innovator.getIdentityList()`.

**JavaScript**

```javascript
// This will get an array of identity IDs from the client cache
var myIdentityIDs = top.aras.getIdentityList().split(',');
```

### 7.22 Want a field to be either a sequence or user entered value

You want to enable a field on the form to be a sequence value or allow the user to enter a value.

**Technique**

Use the classic Aras Innovator API `top.aras.getNetSequence()` method, which returns the next sequence value from the server.

| Note: | The classic API will eventually be eliminated and this method will become available on the IOM Innovator object as `Innovator.getNetSequence()`.

Using the Form Tool we add an HTML Field to the Form, which we use to insert the HTML and JavaScript code for to provide the button to get the next sequence value and update the Field value and client cache.
**HTML Field code**

```html
<a href="javascript:getNextNumber();">
    <img src="../images/Sequence.svg" border="0" style="max-width: 20px; max-height: 20px;">
</a>
<script>
    function getNextNumber() {
        // Get the next sequence value.
        var seq = top.aras.getNextSequence("","Default Part");

        // This will update the client cache with the new value.
        handleItemChange("item_number", seq);
    }
</script>
```

### 7.23 Want to Vault a File

You want to save a Document with an attached File

**Technique**

Use the IOM newItem() and attachPhysicalFile() methods to create an Item of type File and set up the request to be submitted to the Vault Server.

**JavaScript**

```javascript
// Create the Document item
var docItem = this.newItem("Document","add");
docItem.setProperty("item_number","123");

// Create the File item and set the path to the file.
var fileItem = this.newItem("File","add");
fileItem.setProperty("filename","My Document.doc");
fileItem.attachPhysicalFile("C:\\My Document.doc");

// Create the relationship between the Document and File
var relItem = this.newItem("Document File","add");
docItem.addRelationship(relItem);
relItem.setRelatedItem(fileItem);

var results = docItem.apply();
if (results.isError()) {
    top.aras.AlertError(results.getErrorDetail());
} else {
    // Show the new Document
    top.aras.uiShowItemEx(results.getItemByIndex(0).node, 'tab view', true);
}
```
7.24 Want to get an existing Vaulted File and save it with a new Document

You want to get an existing File from the Vault and attach it to a new Document.

Technique

This is similar to the last recipe, but uses the `getItemByKeyedName()` method to get an existing File item and `copyAsNew()` to create it as a new File Item.

JavaScript

```javascript
// Create the Document item
var docItem = this.newItem("Document","add");
docItem.setProperty("item_number","456");

// Get the File item
var innovator = this.getInnovator();
var fileItem = innovator.getItemByKeyedName("File","My Document.doc");
if (fileItem.isError()) {
    top.aras.AlertError(fileItem.getErrorDetail());
    return;
}
// Duplicate File Item as files should be 1 to 1
var newFile = fileItem.apply("copyAsNew");
// Create the relationship between the Document and File
var relItem = this.newItem("Document File","add");
docItem.addRelationship(relItem);
relItem.setRelatedItem(newFile);

var results = docItem.apply();
if (results.isError()) {
    top.aras.AlertError(results.getErrorDetail());
} else {
    // Show the new Document
    top.aras.uiShowItemEx(results.getItemByIndex(0).node, 'tab view', true);
}
```

7.25 Want to open a Vaulted File in Word

You want to open an existing File from the Vault in Word.

Technique

We first checkout the file from the vault to our local drive and then open the file in Word. The following code can be placed in a client side Method and called via a generic Action with target='none' so that only the Word window is actually opened.

**Note:** The use of the ActiveX object is only supported in Internet Explorer

JavaScript

```javascript
// Prompt the user for the file name and retrieve the File item
var docName = prompt("Enter the Document Name: ","");
var innovator = this.getInnovator();
var docItem = innovator.newItem("Document","get");
```
docItem.setProperty("keyed_name",docName);
var relItem = innovator.newItem("Document File","get");
relItem.setAttribute("select","related_id(keyed_name)");
docItem.addRelationship(relItem);
docItem = docItem.apply();
if (docItem.isError()) {
    top.aras.AlertError("Document Not Found: "+docItem.getErrorDetail());
    return;
}

var folder = top.aras.getWorkingDir();
var results, fileName;
if(docItem.getRelationships().getItemCount() > 0) {
    results =
    docItem.getRelationships().getItemByIndex(0).fetchFileProperty("related_id",folder+"\", 0);
    fileName =
    docItem.getRelationships().getItemByIndex(0).getRelatedItem().getProperty("keyed_name");
}
if (results.isError()) {
    top.aras.AlertError("Unable to retrieve the file from the vault");
    return;
}

// Open the file in Word.
try {
    var word = new ActiveXObject("Word.Application");
    word.visible = true;
    word.documents.open(folder + "\" + docName);
} catch(e) {
    top.aras.AlertError("Unable to launch Word. File saved as: "+folder + "\" + fileName);
    return;
}
7.26 Need to reject an Item Promote

You want to reject an Item Promote if a value of Property is invalid.

**Technique**

Use the Pre Server Method on the Life Cycle Transition to call a server side Method to validate the Item before it is promoted and if invalid rejects the Promote by returning an Error Item.

![Life Cycle Map](image)

**Figure 8.**

**C#**

```csharp
Innovator innovator = this.getInnovator();
if (Convert.ToDecimal(this.getProperty("cost")) > 500) {
    Item error = innovator.newError("Error promoting: Item costs more than $500.00");
    return error;
}
return this;
```

**VB.Net**

```vbnet
Dim innovator As Innovator = Me.getInnovator()
If CDec(Me.getProperty("cost")) > 500 Then
    Dim Err As Item = innovator.newError("Error promoting: Item costs more than $500.00")
    Return Err
End If
```
7.27 How to build XML for grid

- `<table>` Tag
  The `<table>` tag has the following attributes.

- `<thead>` Tag
  The `<thead>` tag defines the header.

- `<th>` Tag
  The same as `<td>` tag. See below.

- `<columns>` Tag
  The `<columns>` tag has no attributes. Contains `<column>` tags

- `<column>` Tag
  The `<column>` tag defines grid column.

### Table 19:

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Type</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>width</td>
<td>Integer</td>
<td>Width in pixels.</td>
</tr>
<tr>
<td>Align</td>
<td>String</td>
<td>Text alignment.</td>
</tr>
<tr>
<td>Order</td>
<td>Integer</td>
<td>The column order.</td>
</tr>
<tr>
<td>Edit</td>
<td>String</td>
<td></td>
</tr>
<tr>
<td>bginvert</td>
<td>Boolean</td>
<td>Invert background color of selected cell from this column.</td>
</tr>
<tr>
<td>Sort</td>
<td>String</td>
<td>NOSORT</td>
</tr>
<tr>
<td>inputformat</td>
<td>String</td>
<td></td>
</tr>
<tr>
<td>colname</td>
<td>String</td>
<td></td>
</tr>
<tr>
<td>locale</td>
<td>String</td>
<td></td>
</tr>
</tbody>
</table>

- `<inputrow>` Tag
  The `<inputrow>` tag defines the input row, has no attributes, and contains `<td>` tags. has attribute `visible`.

- `<tr>` Tag
  The `<tr>` tag defines a row. Contains `<td>`, `<th>`, and `<userdata>` tags.

### Table 20:

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Type</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>id</td>
<td>String</td>
<td>Row ID.</td>
</tr>
</tbody>
</table>
• `<td>` Tag
   The `<td>` tag defines the cell.

Table 21:

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Type</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>font</td>
<td>String</td>
<td>Font.</td>
</tr>
<tr>
<td>textcolor</td>
<td>String</td>
<td>Set the foreground color.</td>
</tr>
<tr>
<td>bgcolor</td>
<td>String</td>
<td>Set the background color.</td>
</tr>
<tr>
<td>link</td>
<td>String</td>
<td></td>
</tr>
<tr>
<td>ftd</td>
<td>String</td>
<td></td>
</tr>
<tr>
<td>css</td>
<td>String</td>
<td></td>
</tr>
</tbody>
</table>

• `<userdata>` Tag
   The `<userdata>` tag defines user data for the row.

Table 22:

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Type</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>key</td>
<td>String</td>
<td>Key for the value.</td>
</tr>
<tr>
<td>value</td>
<td>String</td>
<td>The value.</td>
</tr>
</tbody>
</table>

• `<list>` Tag
   The `<list>` tag defines a list and contains `<listitem>` tags.

Table 23:

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Type</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>id</td>
<td>String</td>
<td><em>The ID for the list.</em></td>
</tr>
</tbody>
</table>

• `<listitem>` Tag
   The `<listitem>` tag defines the item for the list.

Table 24:

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Type</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>label</td>
<td>String</td>
<td>The label for the list item.</td>
</tr>
<tr>
<td>value</td>
<td>String</td>
<td>The value for the list item.</td>
</tr>
</tbody>
</table>
## 7.28 How to build XML for a Menu

- `<menuapplet>` Tag
  The `<menuapplet>` tag contains `<menubar>` tags.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Type</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>show</td>
<td>String</td>
<td>The identifier of visible toolbar. If this parameter is absent, first menubar from list is visible.</td>
</tr>
</tbody>
</table>

- `<menubar>` Tag
  The `<menubar>` tag contains `<item>`, `<checkitem>`, and `<separator>` tags.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Type</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>id</td>
<td>String</td>
<td></td>
</tr>
</tbody>
</table>

- `<item>` Tag
  The `<item>` tag defines a menu item.

- `<checkitem>` Tag
  The `<checkitem>` tag defines a toggle button menu item.

- `<separator>` Tag
  The `<separator>` tag defines a separator for the menu.

## 7.29 How to handle multilingual properties

You want to programmatically get/set multilingual string properties

**Technique**

Use `Item.setAttribute("language","*")` to get all language values and `Item.setProperty(myProperty,value,lang)` to set specific language values.

**JavaScript**

```javascript
var inn = this.getInnovator();

// Add a new List with multilingual Value labels
var listItem = this.newItem("List","add");
listItem.setProperty("name","Numbers");
var valueItem = listItem.createRelationship("Value","add");
valueItem.setProperty("value","1");
valueItem.setProperty("label","One","en");
valueItem.setProperty("label","Ein","de");
var valueItem2 = listItem.createRelationship("Value","add");
valueItem2.setProperty("value","2");
```
valueItem2.setProperty("label","Two","en");
valueItem2.setProperty("label","Zwei","de");
var resultItem = listItem.apply();
if (resultItem.isError()) {
    return inn.newError("Error adding List: " + resultItem.getErrorDetail());
}

// Retrieve the List with labels in both English and German
listItem = this.newItem("List","get");
listItem.setProperty("name","Numbers");
valueItem = listItem.createRelationship("Value","get");
valueItem.setAttribute("language","en,de");
resultItem = listItem.apply();
if (resultItem.isError()) {
    return inn.newError("Error retrieving List: " + resultItem.getErrorDetail());
}

VB.Net

Dim inn As Innovator = Me.getInnovator()

' Add a New List With multilingual Value labels
Dim listItem As Item = Me.newItem("List","add")
listItem.setProperty("name","Numbers")
Dim valueItem As Item = listItem.createRelationship("Value","add")
valueItem.setProperty("value","1")
valueItem.setProperty("label","One","en")
valueItem.setProperty("label","Ein","de")
Dim valueItem2 As Item = listItem.createRelationship("Value","add")
valueItem2.setProperty("value","2")
valueItem2.setProperty("label","Two","en")
valueItem2.setProperty("label","Zwei","de")
Dim resultItem As Item = listItem.apply()
If (resultItem.isError()) Then
    Return inn.newError("Error adding List: " + resultItem.getErrorDetail())
End If

' Retrieve the List with labels In both English And German
listItem = Me.newItem("List","get")
listItem.setProperty("name","Numbers")
valueItem = listItem.createRelationship("Value","get")
valueItem.setAttribute("language","en,de");
resultItem = listItem.apply()
If (resultItem.isError()) Then
    Return inn.newError("Error retrieving List: " + resultItem.getErrorDetail())
End If

Return inn.newResult("ok")

### 7.30 How to handle date properties

You want to programmatically get/set date properties
Technique

Convert date values to "yyyy-MM-ddThh:mm:ss" format before setting the property

JavaScript

// Get yesterday's date
var myDate = new Date();
myDate.setDate(myDate.getDate()-1);

// Find all methods edited in the past 24 hours
var myItem = this.newItem("Method","get");
myItem.setAttribute("select","name");
myItem.setProperty("modified_on",dateFormat(myDate));
myItem.setPropertyAttribute("modified_on","condition","gt");
myItem = myItem.apply();

// Loop through the returned methods and return the list
var methodList = new String(""),
for (var i=0; i<myItem.getCount(); i++) {
    methodList += myItem.getByIndex(i).getProperty("name","") + ", ";
} top.aras.AlertError("The following methods were modified in the past 24 hours: "+methodList.substr(0,methodList.length-2));

function dateFormat(d) {
    var dateString = d.getFullYear()+"-"
    dateString += pad(d.getMonth()+1)+"-";
    dateString += pad(d.getDate())+"T";
    dateString += pad(d.getHours())+":";
    dateString += pad(d.getMinutes())+"":";
    dateString += pad(d.getSeconds());
    return dateString;
}

function pad(x) {
    return (x<10) ? "0"+x : ""+x;
}

VB.Net

' Get yesterday's date
Dim myDate As Date = Now.AddDays(-1)

' Find all methods edited in the past 24 hours
Dim myItem As Item = Me.newItem("Method","get")
myItem.setAttribute("select","name")
myItem.setProperty("modified_on",myDate.ToString("yyyy-MM-ddThh:mm:ss"))
myItem.setPropertyAttribute("modified_on","condition","gt")
myItem = myItem.apply()

' Loop through the returned methods and return the list
Dim methodList As String = ""
Dim i As Integer = 0
For i = 0 To myItem.getCount() - 1
    methodList += myItem.getByIndex(i).getProperty("name","") + ", ";
Next i
Dim inn As Innovator = Me.getInnovator()
Return inn.newError("The following methods were modified in the past 24 hours: "+Left(methodList,methodList.Length-2))

7.31 How to pass values from onBeforeX to onAfterX events

You want to pass some value from an onBefore (i.e. onBeforeUpdate) event to an onAfter (i.e. onAfterUpdate) event for data process handling

Technique

Use the built in function to add a variable, read a variable and remove a variable from the RequestState. This sample determines if there was a change made to the “Name” property of Part.

C#

OnBeforeUpdate event

//Get Part Name before change

Innovator inn = this.getInnovator();
Item myPart = inn.newItem("Part","get");
myPart,ID(this.getID());
myPart.setAttribute("select","name");
myPart=myPart.apply();
string prevName = myPart.getProperty("name");
RequestState.Add("prevName", prevName); //Add value to SessionState
return this;

OnAfterUpdate event

string prevName = (string)RequestState["prevName"]; 
string curName = this.getProperty("name");

if (prevName != curName)
{
    //Do some logic here
}

//Perform cleanup of RequestState
RequestState.Remove("prevName"); //removes single key
// to remove all keys use RequestState.Clear();
return this;

7.32 How to reference custom DLL from server method

You want to reference a custom library from inside an Aras Innovator Server Method

Technique

Create a custom DLL that references the IOM. This DLL is then added to the BIN folder and referenced in the method-config.xml, allowing it to be called from a server side method.
Create the custom DLL

To create the custom DLL, it is necessary to create a Visual Studio C# class library project using .NET 4. The project needs to reference the IOM of the version of Aras Innovator you are connecting to.

Class Code

```csharp
namespace CookBookCustomDLL
{
    public class CustomDLLFunc
    {
        public static string returnUser(Innovator inn)
        {
            string userID = inn.getUserID();
            return userID;
        }
    }
}
```

Code tree setup with new DLL

Once you have created the DLL and built the assembly, you need to use the steps below to add the DLL to your Aras Innovator code tree

1. Copy the CookBookCustomDLL.dll and CookBookCustomDLL.pdb into the \Innovator\Server\bin folder

2. Open for Edit the \Innovator\Server\Method-Config.xml and add the highlighted line

```xml
...<ReferencedAssemblies>
    <name>System.dll</name>
    <name>System.XML.dll</name>
    <name>System.Web.dll</name>
    <name>System.Data.dll</name>
    <name>System.Core.dll</name>
    <name>System.Configuration.dll</name>
    <name>$((binpath)/IOM.dll</name>
    <name>$((binpath)/InnovatorCore.dll</name>
    <name>$((binpath)/CoreCS.dll</name>
    <name>$((binpath)/SPConnector.dll</name>
    <name>$((binpath)/ConversionManager.dll</name>
        <name>$((binpath)/CookBookCustomDLL.dll</name>
...<Template name="CSharp" line_number_offset="41">
    <![CDATA[
using CookBookCustomDLL;
    ...
```
Call new DLL from Innovator Server method.

Code snippet that can be used as a reference for how to call your assembly and function

Code Snippet

```csharp
Innovator inn = this.getInnovator();
string userID = CustomDLLFunct.returnUser(inn);
```

Assembly Redirection

If your custom DLL references the current version of the IOM, and you upgrade Aras Innovator to a newer version, your function fills to execute due to an assembly mismatch on the IOM. A quick workaround until the DLL can be rebuilt referencing the latest IOM is to add an assembly redirect.

To add an assembly redirect, you need to add the following into the `<configuration>` section of the `\Innovator\Server\web.config` file.

```xml
<runtime>
  <assemblyBinding xmlns="urn:schemas-microsoft-com:asm.v1">
    <dependentAssembly>
      <assemblyIdentity name="IOM"
        publicKeyToken="524d880b05474146"
        culture="neutral" />
      <bindingRedirect oldVersion="9.4.0.5804" newVersion="9.4.0.5815" />
    </dependentAssembly>
  </assemblyBinding>
</runtime>
```

The oldVersion, highlighted in yellow above, is the original version of the IOM.dll referenced by the custom DLL. The newVersion, highlighted in red text above, is the version of the IOM.dll that is located in the upgraded instance of Aras Innovator.

7.33 How to add sub menus to context menu in search grid

There is a possibility of adding sub menus to the context menu in the search grid of Aras Innovator menu items. Aras.Client.Controls.ContextMenu control supports submenus. It provides two methods for adding menu items:

1. add(id, label, parentMenuId, args);
2. addRange(items, parentMenuId);

Below are the examples given for itemsGrid.html:

Example #1

```javascript
var menu = grid.getMenu();
menu.add("item_0", "Item 0");
menu.add("item_0.0", "Item 0.0", "item_0", { onClick: function () { alert(0); } });
menu.add("item_0.1", "Item 0.1", "item_0", { onClick: function () { alert(1); } });
menu.add("item_0.2", "Item 0.2", "item_0", { onClick: function () { alert(2); } });
```
Example #2

```javascript
var menu = grid.getMenu(),
    subMenus = [
    {
        id: "item_0.0",
        name: "Item 0.0",
        onClick: function () { alert(0); }
    },
    {
        id: "item_0.1",
        name: "Item 0.1",
        onClick: function () { alert(1); }
    },
    {
        id: "item_0.2",
        name: "Item 0.2",
        onClick: function () { alert(2); }
    }
];
menu.add("item_0", "Item 0");
menu.addRange(subMenus, "item_0");
```
8 Aras Innovator Solution Studio

The Aras Innovator Solution Studio is the user interface you use to author the code for your Innovator Methods. It is automatically launched when you open a Method Item in Aras Innovator client.

8.1 Features

The Solution Studio offers several useful features to help aid you in the development of your Methods.

- A robust text editor with search/replace and undo/redo capabilities.
- Color coding the keywords for the language you are developing in.
- An IOM API code guide.
- An online help interface that is context sensitive for the methods selected in the code guide.
- Syntax checking based on the language you are developing in.

Figure 9.

Syntax checker
Undo/Redo
Search/Replace
IOM API Code Guide
Keyword Color Coding
IOM API Online Help
9 Debugging

Aras Innovator has the following features for debugging/logging your Methods:

- Visual Studio to debug Methods either client or server.
- Logging of debug messages to an XML formatted log file.

9.1 Enabling Debugging in Aras Innovator

Server method debugging is disabled by default in Aras Innovator 11.0. This setting saves disk space as the temporary dlls used for debugging the methods do not need to be created.

To enable the debugging of Server Methods, you can add the following line to your “InnovatorServerConfig.xml”, located in the root folder of your installation.

```xml
<operating_parameter key="DebugServerMethod" value="true" />
```

Server method debugging can then be disabled again by changing the value of this line to false.

After changing this value, you should restart IIS to confirm the change is applied.

9.2 Setting up VS.NET 2012 to debug Server side Methods

2. Choose Tools → Attach to Processes….
3. Choose `w3wp.exe` and click ‘Attach’.

![Attach to Process dialog box](image)

Figure 11.

4. Choose **Debug --> Exceptions** to force the method into the debugger when an exception occurs and choose the check boxes “Thrown”.

![Exceptions dialog box](image)

Figure 12.

5. Optionally, you can include the line `System.Diagnostics.Debugger.Break()` to force a breakpoint at a specific line in your method.
9.3 Setting up VS.NET 2012 to debug Client side Methods

1. Include the line `debugger;` to your Method.
2. Open "Internet Explorer" to set debugger options.
3. Choose **Tools --> Internet Options**.

![Figure 13.](image)

4. Select the **Advanced** tab and make sure the "Disable Script Debugging" is turned off and "Display notification about script errors" is turned on.

![Figure 14.](image)

5. In Internet Explorer, key in your Aras Innovator URL (Do not log in yet).
7. In the menu, select "**Debug**" and "**Attach to Process**".
8. Find the "iexpore.exe" process with the "Title" that matches your Aras Innovator instance.
9. Select it and click "Attach".

10. Return to the login screen for Aras Innovator and press F5 to refresh the page.

11. Log in to Aras Innovator.

12. Run the Method and the application switches to the "Microsoft Visual Studio .NET 2012" debugger and break on the debugger; line.

### 9.4 Setting up the server side logging

Add the following lines to the InnovatorServerConfig61.xml file:

```xml
<operating_parameter key="debug_log_flag" value="true" />
<operating_parameter key="debug_log_prefix" value="C:/TEMP/DEBUG-" />
<operating_parameter key="debug_log_limit" value="1000" />
```

In order to write messages to the C:/TEMP/DEBUG-* log file, add the following lines of code to the server side method:

```vbscript
Dim sc as Object = Me.serverConnection
sc.cco.startup.debuglog("Unique string to identify message in log file", "Actual message written to log file")
```
10 External APIs

There are a few ways to connect to the Aras Innovator server from other applications. Aras provides three assemblies (.NET, COM-compatible, and RT) that implement the IOM API and can be used by other applications. Alternatively, simple SOAP communication can be used to connect to Aras Innovator.

10.1 .NET IOM

A .NET version of IOM.dll can be found in the \Utilities\Aras Innovator <Version> IOM SDK\ .NET directory on the CD Image and may be copied to another location and referenced by .NET project. IOM APIs belong to Aras.IOM namespace. First, every application must create a connection with Innovator server and login to Innovator server using the connection. If login succeeded then an instance of class Innovator must be created with the connection.

Here is a small sample:

```csharp
using Aras.IOM;
...
String url = "http://myserver/MyInnovator/Server/InnovatorServer.aspx";
String db = "MyDB";
String user = "admin";
String password = "innovator";
HttpServerConnection conn =
    IomFactory.CreateHttpServerConnection( url, db, user, password );
Item login_result = conn.Login();
if( login_result.isError() )
    throw new Exception( "Login failed" );
Innovator inn = IomFactory.CreateInnovator( conn );
...
```

**Note:** You can pass either encrypted (if required, use static method Innovator.ScalcMD5(string pwd) for encryption) or non-encrypted password (like in the sample above) to the method IomFactory.CreateHttpServerConnection(…). If non-encrypted password is passed it'll be encrypted inside the method; otherwise the password is passed to the server without modifications.

It's highly recommended to logout from Innovator prior to exiting the application:

```csharp
...
conn.Logout();
...
```
10.2 COM-compatible IOM

A COM-compatible version version of IOM.dll can be found in the \Utilities\Aras Innovator <Version> IOM SDK\NET directory on the CD Image. This assembly can be used to build Windows applications in VB6 or VC++ or write, for example, VBA office macros or Windows Scripting Host applications (VBScript or Jscript).

The DLL must register in order to use. The steps to do so are as follows:

- Copy IOM.dll into a local folder.
- Open a DOS window and enter the regasm command to register the DLL:
  ```
  regasm IOM.dll /tlb /codebase /verbose
  ```

If the assembly was successfully registered it must appear in the list of available COM references as "Aras API". Add the reference to you project. Similar to .NET user first must to create a connection, login and then create Innovator object. Here is a sample code in VBA:

```vba
Note: The use of the ActiveX object is only supported in Internet Explorer

... Dim url As String: url = "http://myserver/MyInnovator/Server/InnovatorServer.aspx" Dim db As String: db = "MyDB" Dim user As String: user = "admin" Dim password As String: password = "innovator"

Dim factory As New IomFactory Dim conn As HttpServerConnection: Set conn = factory.CreateHttpServerConnection(url, db, user, password)

Dim login_result As Item: Set login_result = conn.Login If login_result.IsError Then MsgBox "Failed to login" Exit Function End If

Dim inn As Innovator: Set inn = factory.CreateInnovator(conn)...
```

The following is a JScript example:
```javascript
var innServerURL = "http://localhost/InnovatorServer/Server/InnovatorServer.aspx";
var dbID = 'MyDB';
var login = 'admin';
var password = 'innovator';

var iomFactory = new ActiveXObject("Aras.IOM.IomFactory.8.2");

var httpServerConnection = iomFactory.CreateHttpServerConnection(innServerURL, dbID, login, password);
var loginResult = httpServerConnection.login();
if (loginResult.IsError()) {
    WScript.echo(loginResult.GetErrorDetail());
}
```
else
{
    var myInnovator = iomFactory.CreateInnovator(httpServerConnection);

    var queryItem = myInnovator.newItem();
    queryItem.setType("User");
    queryItem.setAction("get");
    queryItem.setAttribute("select","login_name");
    var resultItem = queryItem.apply();
    if (!resultItem.IsError())
    {
        WScript.echo("Number of users: "+resultItem.getItemCount());
    }
    else
    {
        WScript.echo(resultItem.GetErrorDetail());
    }

    httpServerConnection.logout();
}

10.3 RT IOM

A RT version of IOM.RT.dll can be found in the \Utilities\Aras Innovator <Version> IOM SDK\COM\RT directory on the CD Image and may be copied to another location and referenced by Windows App Store project. IOM APIs belong to Aras.IOM namespace. First, every application must create a connection with Innovator server and login to Innovator server using the connection. If login succeeded then an instance of class Innovator must be created with the connection. Here is a small sample:

... using Aras.IOM;
...

    //create connection to Innovator server
    string server = "http://localhost/InnovatorServer";
    string db = "InnovatorSolutions";
    string username = "admin";
    string password = "innovator";
    HttpServerConnection connection =
    IomFactory.CreateHttpServerConnection(server, db, username, password);
    //login
    Item user = await connection.LoginAsync();
    if (user.isError())
    {
        throw new Exception(user.getErrorString());
    }
10.4 iOS IOM

An iOS version of IOM.IOS.dll can be found in the \Utilities\Aras Innovator <Version> IOM SDK\iOS directory on the CD Image and may be copied to another location and referenced by an iOS Mobile App using Xamarin’s existing framework to generate an iOS App project. IOM APIs belong to Aras.IOM namespace. First, every application must create a connection with Innovator server and login to Innovator server using the connection. If login succeeded then an instance of class Innovator must be created with the connection. Here is a small sample:

```csharp
using Aras.IOM;
...

//create connection to Innovator server
string server = "http://localhost/InnovatorServer";
string db = "InnovatorSolutions";
string username = "admin";
string password = "innovator";
HttpServerConnection connection = IomFactory.CreateHttpServerConnection(server, db, username, password);
//login
Item user = await connection.LoginAsync();
if (user.isError())
{
    throw new Exception(user.getErrorString());
}
```

10.5 Android IOM

A RT version of IOM.Android.dll can be found in the \Utilities\Aras Innovator <Version> IOM SDK\Android directory on the CD Image and may be copied to another location and referenced by an Android App using Xamarin’s existing framework to generate an Android project. IOM APIs belong to Aras.IOM namespace. First, every application must create a connection with Innovator server and login to Innovator server using the connection. If login succeeded then an instance of class Innovator must be created with the connection. Here is a small sample:

```csharp
using Aras.IOM;
...

//create connection to Innovator server
string server = "http://localhost/InnovatorServer";
string db = "InnovatorSolutions";
string username = "admin";
string password = "innovator";
HttpServerConnection connection = IomFactory.CreateHttpServerConnection(server, db, username, password);
//login
Item user = await connection.LoginAsync();
if (user.isError())
{
    throw new Exception(user.getErrorString());
}
```
10.6 SOAP Requests

Although not normally suggested, it is possible to circumvent IOM and use SOAP requests to interact with Aras Innovator. You may use the Microsoft XMLHTTP Object to send the AML to the Aras Innovator Server.

The following is a VBScript example:

```vbnet
Dim innovatorServer
innovatorServer = "http://localhost/InnovatorServer/Server/InnovatorServer.aspx"
Dim database: database = "innovator81"
Dim loginName: loginName = "admin"
Dim password: password = "607920b64fe136f9ab2389e371852af2" 'MD5 hash of the password
Dim soapStart: soapStart = _
Dim soapEnd: soapEnd = "</SOAP-ENV:Body></SOAP-ENV:Envelope>"
Dim soapAction: soapAction = "ApplyItem"
Dim body: body = "<Item type='User' action='get' select='login_name'/>"
Dim soap
soap = soapStart & "<" & soapAction & " xmlns:m='http://www.aras-corp.com/'>" &_ 
   body & "</" & soapAction & ">" & soapEnd

Dim http: Set http = CreateObject("Msxml2.ServerXMLHTTP")
http.open "POST", innovatorServer, false
http.setRequestHeader "SOAPaction", soapAction
http.setRequestHeader "AUTHUSER", loginName
http.setRequestHeader "AUTHPASSWORD", password
http.setRequestHeader "DATABASE", database
http.send(soap)

Dim response: response = http.responseText
Dim responseDom: Set responseDom = CreateObject("microsoft.xmldom")
responseDom.loadXML(response)
Dim userItems: Set userItems = responseDom.selectNodes("//Item[@type='User']")
Wscript.Echo "Number of users: " & userItems.Length

soapAction = "logoff"
body = "logoff"
soap = soapStart & "<" & soapAction & " xmlns:m='http://www.aras-corp.com/'>" &_
   body & "</" & soapAction & ">" & soapEnd
http.open "POST", innovatorServer, false
http.setRequestHeader "SOAPaction", soapAction
http.setRequestHeader "AUTHUSER", loginName
http.setRequestHeader "AUTHPASSWORD", password
http.setRequestHeader "DATABASE", database
http.send(soap)
```