

# Debugging Reactor Applications

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## Module Objectives

In this module, you will learn:

- Debugging in both local and distributed Reactors
  - Attaching debuggers for different IDEs
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## Debugging in a Local Reactor (1 of 2)

Any Continuity Reactor Application can be debugged in the Local Reactor by attaching a remote debugger to the Reactor JVM

To enable remote debugging:

- Start the Local Reactor with the `--enable-debug` option specifying port 5005:

```
$ bin/reactor.sh start --enable-debug 5005
```

- The Reactor should confirm that the debugger port is open with a message confirming that the debugger was started on the requested port:

```
Starting Continuity Reactor .....  
Remote debugger agent started on port 5005.  
Continuity Reactor started successfully  
Connect to dashboard at http://localhost:9999
```

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## Debugging in a Local Reactor (2 of 2)

- Deploy an Application (for example, *HelloWorld*) to the Reactor by dragging and dropping the `HelloWorld.jar` file from the `/examples/HelloWorld` directory onto the Reactor Dashboard
  - Open the *HelloWorld* Application in an IDE and connect to the remote debugger
  - Note: Currently, debugging is not supported under Windows
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## Debugging in Distributed Reactor (1 of 6)

- In distributed mode, an application does not run in a single JVM
- Its programs are dispersed over multiple—if not many—containers in the Hadoop cluster
- There is no single place to debug the entire application
- You can debug an individual container by attaching a remote debugger to it
- This is supported for each Flowlet of a Flow and each instance of a Procedure

To debug a container, you need to start the element with debugging enabled by making an HTTP request to the element's URL

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## Debugging in Distributed Reactor (2 of 6)

The following will start a Flow for debugging:

```
POST <base-url>/apps/WordCount/flows/WordCounter/debug
```

This URL differs from the URL for starting the Flow only by the last path component (`debug` instead of `start`)

- You can pass in runtime arguments in the exact same way as you normally would start a Flow
- Once the Flow is running, each Flowlet will detect an available port in its container and open that port for attaching a debugger

To find out the address of a container's host and the container's debug port, you can query the Reactor for the Flow's live info via HTTP:

```
GET <base-url>/apps/WordCount/flows/WordCounter/live-info
```

The response is formatted in JSON and can be pretty-printed

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## Debugging in Distributed Reactor (3 of 6)

```
{
  "app": "WordCount",
  "containers": [
    {
      "container": "container_1397069870124_0010_01_000002",
      "debugPort": 42071,
      "host": "node-1004.my.cluster.net",
      "instance": 0,
      "memory": 512,
      "name": "unique",
      "type": "flowlet",
      "virtualCores": 1
    },
    {
      "container": "container_1397069870124_0010_01_000005",
      "debugPort": 37205,
      "host": "node-1003.my.cluster.net",
      "instance": 0,
      "memory": 512,
      "name": "splitter",
      "type": "flowlet",
      "virtualCores": 1
    }
  ]
},
```

## Debugging in Distributed Reactor (4 of 6)

(pretty-printed response continued)

```
{
  "id": "WordCounter",
  "runtime": "distributed",
  "type": "Flow",
  "yarnAppId": "application_1397069870124_0010"
}
```

Response includes:

- YARN application id
  - YARN container IDs of each Flowlet
  - Host name and debugging port for each Flowlet
-



## Debugging in Distributed Reactor (5 of 6)

For example, the only instance of the splitter Flowlet is running on `node-1003.my.cluster.net` and the debugging port is 37205:

```
{
  "debugPort": 37205,
  "host": "node-1003.my.cluster.net",
  "instance": 0,
  "memory": 512,
  "name": "splitter",
  "type": "flowlet",
}
```

You can now attach your debugger to this container's JVM

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## Debugging in Distributed Reactor (6 of 6)

The corresponding HTTP requests for the `RetrieveCounts` Procedure of this application would be:

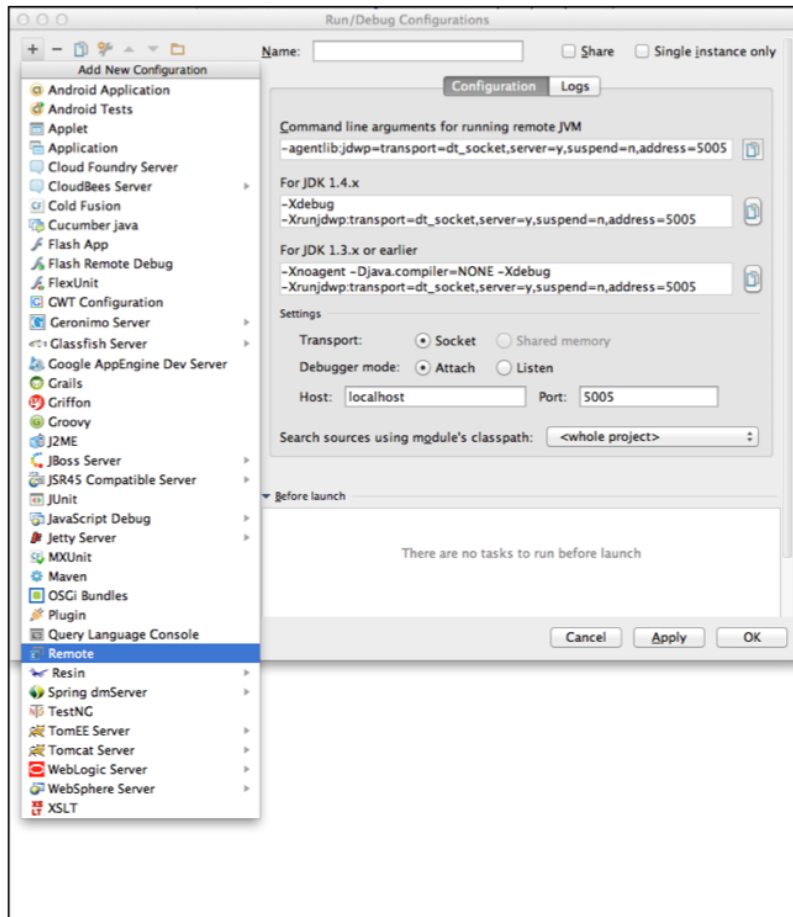
```
POST <base-url>/apps/WordCount/procedures/RetrieveCounts/debug  
GET <base-url>/apps/WordCount/procedures/RetrieveCounts/live-info
```

Analysis of the response would give you the host names and debugging ports for all instances of the Procedure

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## Attaching a Debugger: IntelliJ (1 of 4)

1. From the *IntelliJ* toolbar, select Run->Edit Configurations
2. Click + and choose Remote Configuration:

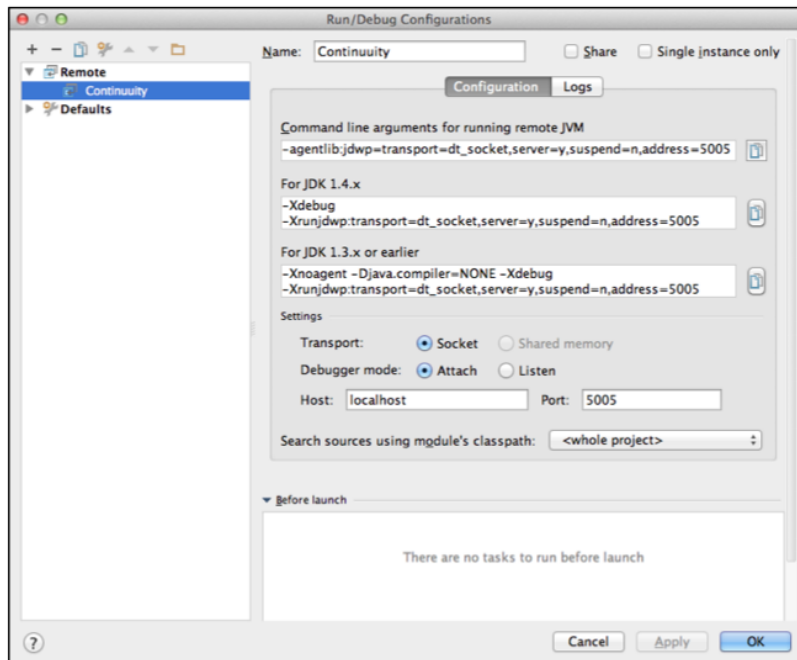


## Attaching a Debugger: IntelliJ (2 of 4)

3. Create a debug configuration by entering a name, for example, `Continuity`
  4. Enter the host name, for example, `localhost` or `node-1003.my.cluster.net` in the Host field
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## Attaching a Debugger: IntelliJ (3 of 4)

5. Enter the debugging port, for example, 5005 in the Port field:



## Attaching a Debugger: IntelliJ (4 of 4)

6. To start the debugger, select Run->Debug->Continuity

7. Set a breakpoint in any code block, for example, a Flowlet method:



```
71 |  
72 | @ProcessInput  
73 | public void process(StreamEvent event) {  
74 |     byte[] name = Bytes.toBytes(event.getBody());  
75 |     if (name != null && name.length > 0) {  
76 |         whom.write(NAME, name);  
77 |     }  
78 |     if (name.length > 10) {  
79 |         flowletMetrics.count("names.longnames", 1);  
80 |     }  
81 |     flowletMetrics.count("names.bytes", name.length);  
82 | }
```

The screenshot shows a Java code editor with a breakpoint (red circle) set on line 73. The code is a method named `process` that takes a `StreamEvent` parameter. It converts the event body to bytes, checks if it's not null and has a length greater than 0, and then writes it to a stream. There are also conditional checks for name length and metrics counting.

8. Start the Flow in the Dashboard

9. Send an event to the Stream

The control will stop at the breakpoint and you can proceed with debugging

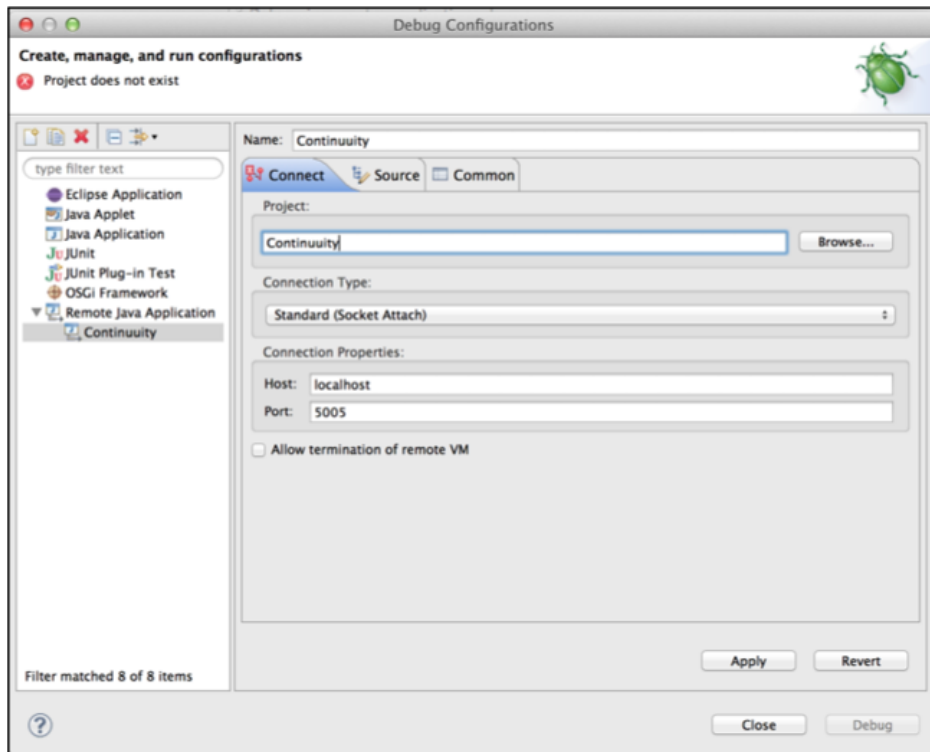
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## Attaching a Debugger: Eclipse (1 of 3)

1. In Eclipse, select `Run->Debug configurations`
  2. In the pop-up, select `Remote Java application`
  3. Enter a name, for example, `Continuity`
  4. Enter the host name, for example, `localhost` or `node-1003.my.cluster.net` in the Host field
  5. Enter the debugging port, for example, `5005` in the Port field
-

## Attaching a Debugger: Eclipse (2 of 3)

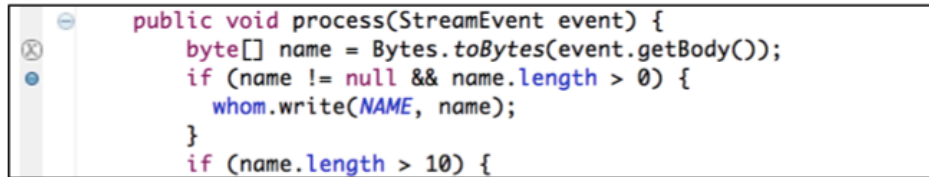
6. Click **Debug** to start the debugger:





## Attaching a Debugger: Eclipse (3 of 3)

7. Set a breakpoint in any code block, for example, a Flowlet method:



```
public void process(StreamEvent event) {  
    byte[] name = Bytes.toBytes(event.getBody());  
    if (name != null && name.length > 0) {  
        whom.write(NAME, name);  
    }  
    if (name.length > 10) {
```

8. Start the Flow in the Dashboard

9. Send an event to the Stream

The control stops at the breakpoint and you can proceed with debugging

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## Module Summary

You should be able to:

- Debugging in both local and distributed Reactors
  - Attach a debuggers in both IntelliJ and Eclipse
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## Module Completed