

The Many JVMs of jtreg

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Purpose

- To explain the various JVMs created in the course of a jtreg test run
- To explain which options affect which JVMs

Contents

- jtreg test execution modes
- JVM(s) for jtreg
- JVM(s) for tests run by jtreg
- Shell tests
- Resource Requirements

Refresher: jtreg modes

| Mode | Description |
|---------|---|
| othervm | Each action of each test is run in its own JVM Maximum isolation ✓ Maximum cost ✗ |
| samevm | Most actions of most tests are run in the same JVM Minimum isolation ✗ Minimum cost ✓ |
| agentvm | Hybrid: reuse JVMs when possible Generally good isolation ✓ Generally low cost ✓ |

Refresher: jtreg modes

| Mode | Notes |
|---------|---|
| othervm | This is the default mode, but for performance reasons, one of the other modes is recommended. |
| samevm | The mode specified on the command line is just the default mode to use for the actions of a test. Individual tests can specify that some or all of their actions must be executed in othervm mode. |
| agentvm | |

Starting jtreg

The initial JVM used for jtreg

| jtreg script | java -jar jtreg.jar |
|---|--|
| <p>Script analyzes options and environment variables for JDK and JVM options used to run jtreg</p> <p>JDK: \${JT_JAVA}, \${JAVA_HOME}, -jdk:*, java</p> <p>JVM Options: -J*</p> | <p>No analysis possible: jtreg uses host JVM</p> |

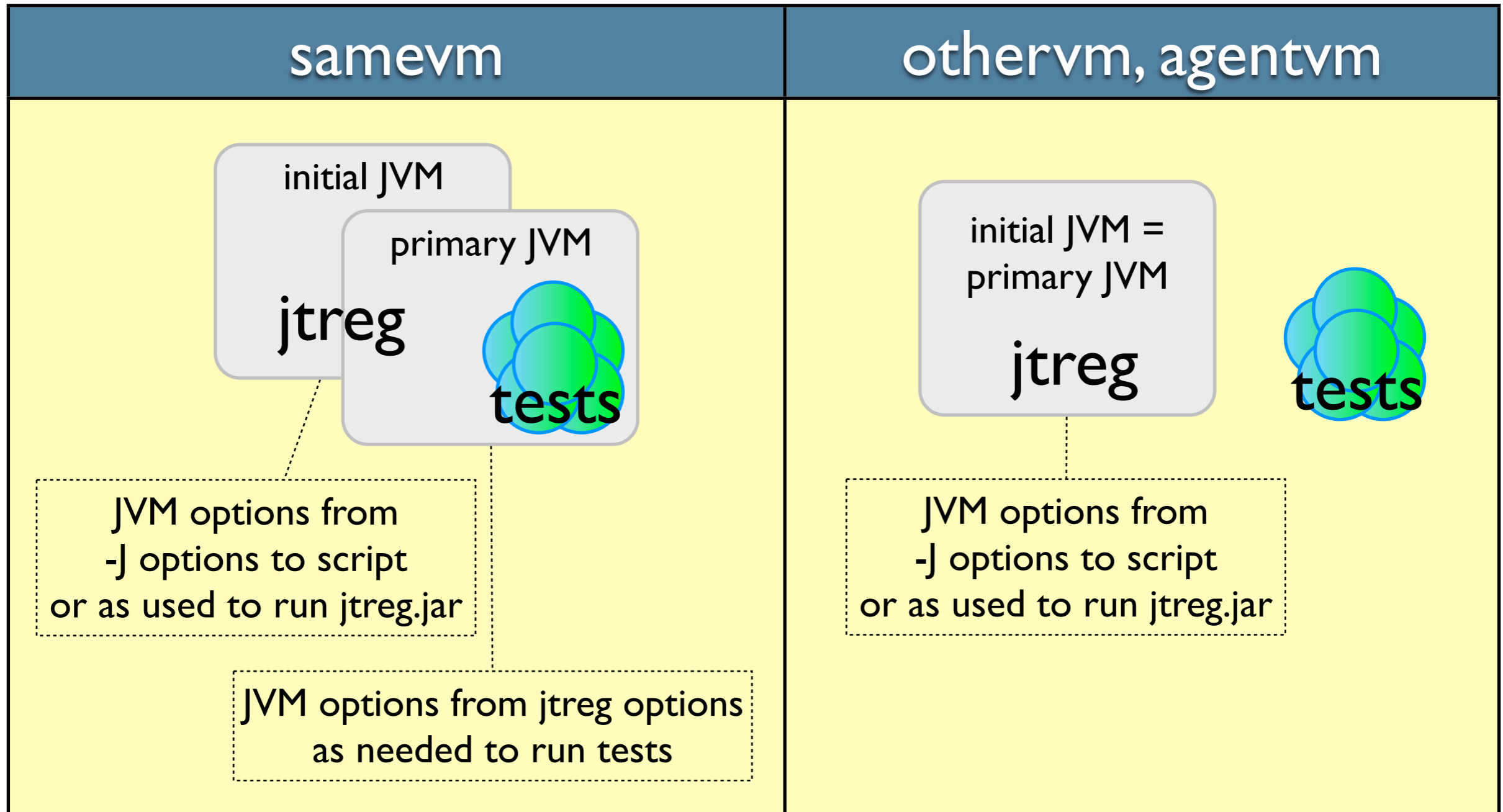
Starting jtreg

The primary JVM used for jtreg

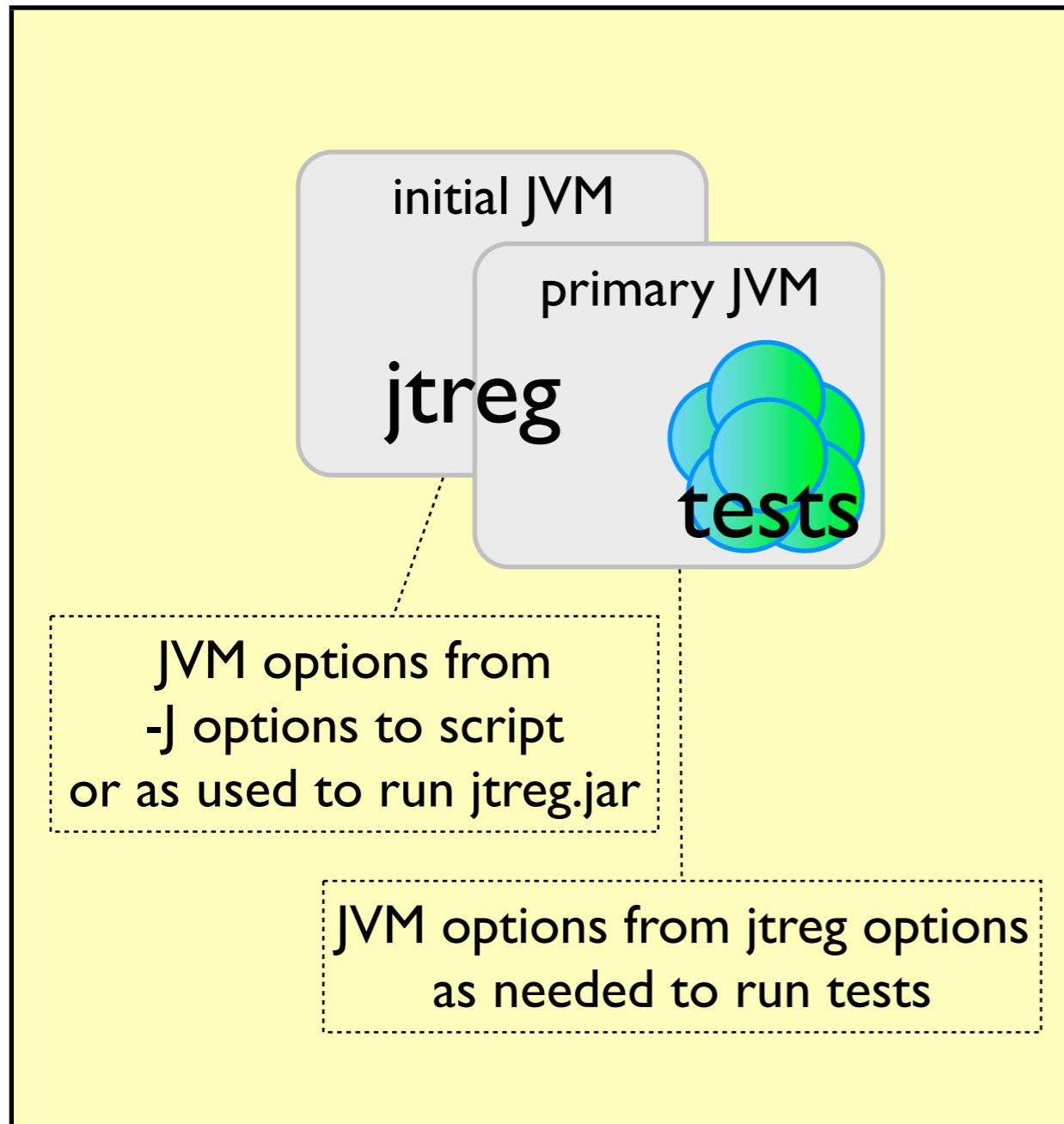
- Running in the initial JVM, jtreg examines the options provided to determine how to run the tests

| samevm | othervm | agentvm |
|---|-------------------------------|---------|
| A child JVM is started to run jtreg and the tests | No additional JVM is required | |

jtreg JVMs

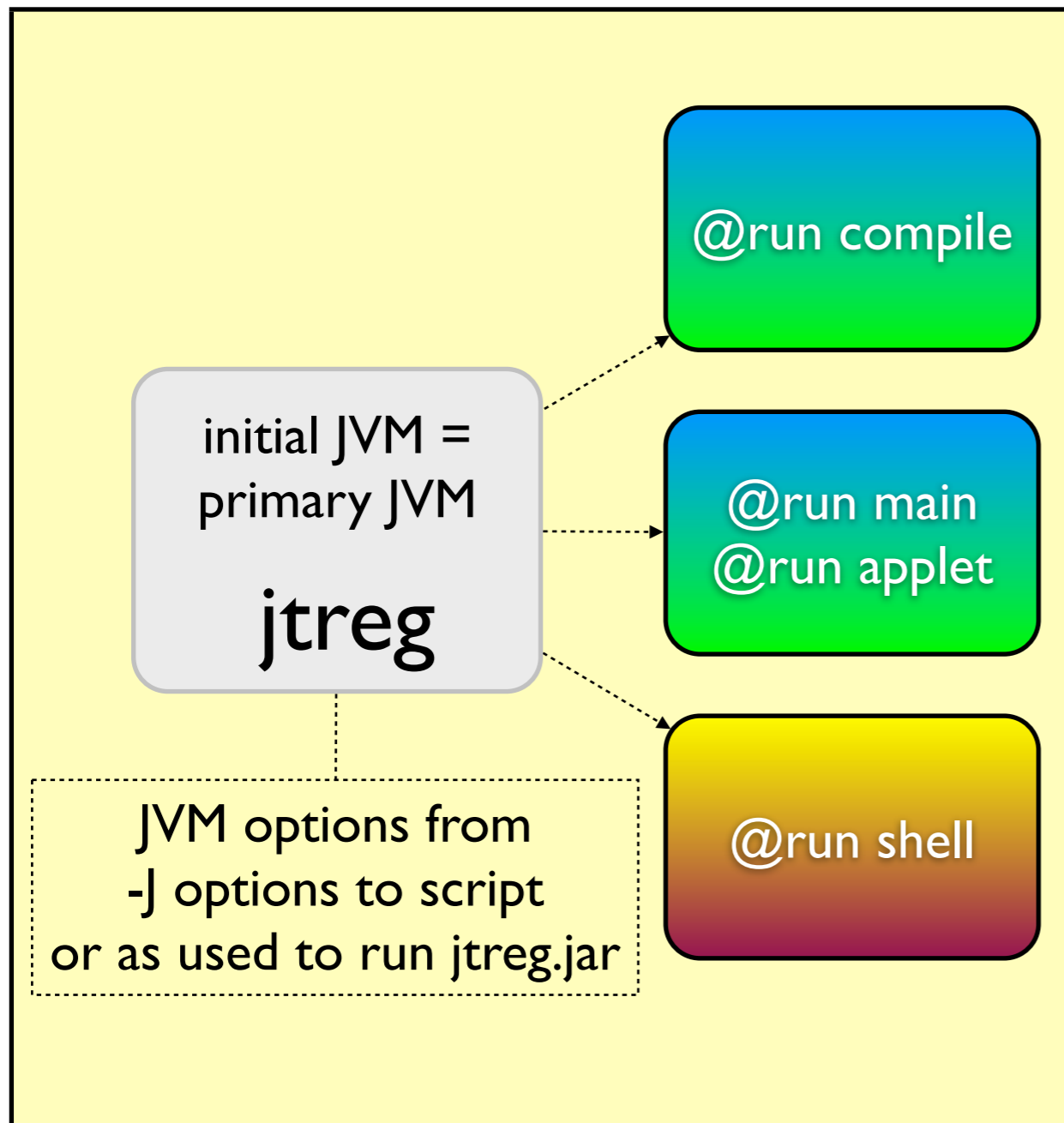


Test JVMs: samevm



- By default, all actions run in the same JVM
- Inherent limitations on JVM and JVM options
 - Compile JDK = Test JDK
 - -javaoptions not allowed

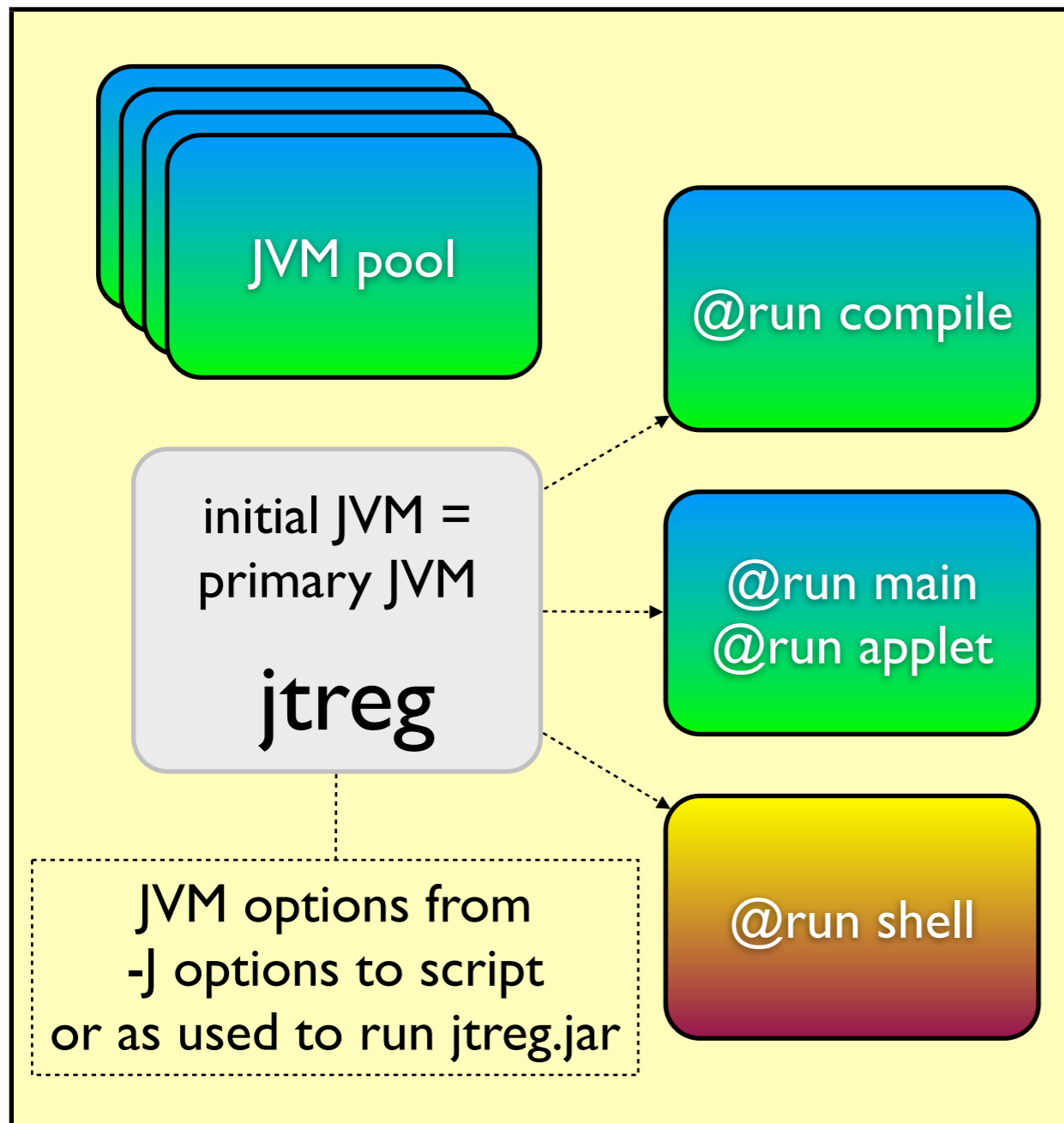
Test JVMs: othervm



- By default, all actions run in a new JVM or process
- Characteristics depend on type of action

| compile | main/applet | shell |
|--|--|--|
| -compilejdk -vmoptions -javacoptions | -testjdk -vmoptions -javaoptions | options available in env variables |

Test JVMs: agentvm



- By default, Java actions run in a JVM with the right characteristics
- Characteristics depend on type of action

| compile | main/applet | shell |
|--|--|------------------------------------|
| -compilejdk -vmoptions -javacoptions | -testjdk -vmoptions -javaoptions | options available in env variables |
| reuse: yes | reuse: if main | reuse: N/A |

Test JVMs: agentvm

- jtreg maintains a pool of available JVMs
- JVMs are created as needed for a given set of characteristics (JDK, JVM options, etc.)
- When no longer needed, JVMs are reset and returned to the pool
- If a JVM cannot be reset, it is discarded

Shell tests

- Shell tests always run in a separate process
- Shell tests may create and run their own JVMs, with javac, java commands
- Shell tests should normally honor the command line options when running javac, java by using the appropriate env variables

Resource Requirements

| Mode | Description |
|---------|---|
| samevm | The “initial JVM” requires minimal resources. The “primary JVM” created by jtreg must have enough resources to run jtreg and the “biggest” test. |
| othervm | The initial/primary JVM must have sufficient resources to run jtreg |
| agentvm | The JVMs started by jtreg must have enough resources to accomodate the “biggest” test |

Concurrent Test Execution

- `jtreg` supports concurrent test execution in `agentvm` and `othervm` modes
- Test actions still isolated into separate JVMs
 - Concurrent test execution not supported in `samevm` mode because of isolation issues
- Concurrent test execution affects total resource requirements

JVM count: samevm

Concurrency not supported

| reason | duration | count |
|----------------------------------|----------|---------------------------|
| To run jtreg | Test Run | 2 |
| For /othervm actions | Action | 1 |
| @run shell or Java equivalent | Action | <i>“as needed”</i> |
| Maximum | | 3 + <i>“as needed”</i> |

JVM count: othervm

-concurrency: N

| reason | duration | count |
|----------------------------------|----------|------------------------------|
| To run jtreg | Test Run | 1 |
| For Java actions | Action | N |
| @run shell or Java equivalent | Action | N^* “as needed” |
| Maximum | | $1 + N + N^*$ “as needed” |

JVM count: agentvm

-concurrency: N

| reason | duration | count |
|----------------------------------|----------|---|
| To run jtreg | Test Run | 1 |
| For Java actions | Test Run | N or $2*N$ <i>depends on options</i> |
| @run shell or Java equivalent | Action | $N *$ “as needed” |
| Maximum | | $1 + 2*N + N *$ “as needed” |

See Also

- <http://openjdk.java.net/jtreg/>
- <http://openjdk.java.net/jtreg/vmoptions.html>
- <http://openjdk.java.net/projects/code-tools/jtreg/>
- <http://openjdk.java.net/projects/code-tools/jtreg/intro.html>
- https://blogs.oracle.com/jjg/entry/jtreg_old_and_new