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JavaFX Packager Tool Integration Deep Dive

Packager: The Launcher

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Java Client Deployment and Performance
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Safe Harbor Statement

Program Agenda

CREATE
THE FUTURE

Goals

Subtitle

Goals

- Improve Build Tool and IDE Integration
- Improve Platform Specific Fidelity
- Easy Distribution of Java Apps
  - App Stores
  - Alternative to Web Start and Applets

New Features

Packager 8u20 Improvements

- API for IDEs and Build Tools
- Extensibility of Bundler Facilities
- New Bundlers
  - Mac PKG Bundler
  - Mac App Store Ready
- Signing of Mac Apps
- Services/Daemons Applications

Packager 8u40 Improvements *

- Single Source Launcher
- Simpler API for JVM User Overrides
- Multiple Launchers Pre Single Package (Windows, Linux)
- File Association Registration as a part of Install
- Default Application Arguments
- Simple DMG

* Subject to change

Launcher Rewrite

Launcher Rewrite

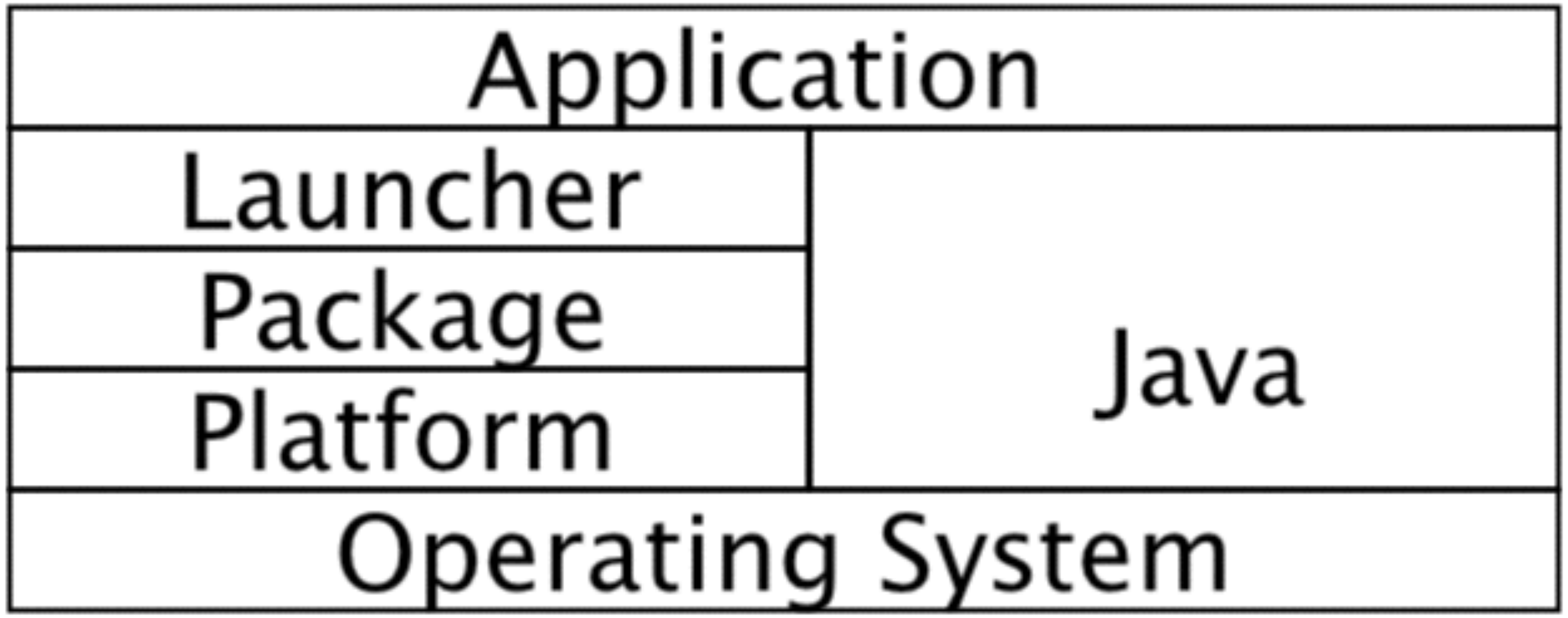
- Single source on Mac, Windows and Linux
- Launcher is a single C++ codebase
  - Minimal #ifdefs
  - Multilayered Architecture for performance and portability
- Redistribution License
  - Source or Binary
  - Use/Change/Distribute as you need!

Launcher Rewrite

- Launcher + Packager Library
  - Example: Launcher.exe and Packager.dll
- Packager.jar
  - Provides Packager Java API
  - Uses Packager Library

Launcher Rewrite

- Internal Architecture
- Cross Platform C++



Launcher Rewrite

Maros in config file

- $APPDIR
  - Directory to root of package.
- $PACKAGEDIR
  - Directory to root + /app on Windows and Linux or Contents/Java on
  - Mac. This is where all developer files go.
- $LAUNCHERDIR
  - Directory where the launcher lives. Same as $APPDIR on Windows and Linux or Contents/MacOS on Mac.
- $JREHOME
  - Root directory of the JRE being used.

Layout of Bundled Application

Layout of Bundled Application

Windows

- MyAwesomeApp\
  - app\
    - MyAwesomeApp.cfg
    - MyAwesomeApp.jar
    - Packager.jar
  - MyAwesomeApp.exe
  - packager.dll
  - msvcr100.dll
  - msvcp100.dll
  - runtime\jre

Layout of Bundled Application

Linux

- MyAwesomeApp/
  - app/
    - MyAwesomeApp.cfg
    - MyAwesomeApp.jar
    - Packager.jar
  - MyAwesomeApp
  - libpackager.so
  - runtime/jre

Layout of Bundled Application

OS X

- MyAwesomeApp.app/Contents
  - Java/
    - MyAwesomeApp.cfg
    - MyAwesomeApp.jar
    - Packager.jar
  - MacOS/
    - MyAwesomeApp
    - libpackager.dylib
  - Plugins/jdk1.8.0.jdk

Bundler API

Bundler API Goals

- Allow for future unknown bundlers to be added to the system
- Allow tools (API/IDE) to
  - Provide useful information on success/failures
  - Provide useful information on configuration of the bundlers
- Allow for multiple platforms to share the same configuration

Bundler Discovery and Registration

`com.oracle.tools.packager.Bundlers`

- Holds loaded bundlers
- Bundlers can be added
  - Via manual method call `loadBundler`
  - Via `META-INF/Services` and `ServiceLoader`
  - “Well Known” Bundlers known to the JDK

- Default instance loads well known bundlers and ServiceLoader bundlers

Bundler Object Anatomy - Nouns

- User Facing Text Friendly (no API impact of results)

```
String getName();
String getDescription();
```

- ID for build tools and IDEs

```
String getID();
```

- Metadata

```
String getBundleType();
Collection<BundlerParamInfo<?>> getBundleParameters();
```

Bundler Object Anatomy - Verbs

- Validation of Parameters

```
boolean validate(
  Map<String, ? super Object> params)
throws UnsupportedPlatformException,
       ConfigException;
```

- Execution of Bundler

```
public File execute(
    Map<String, ? super Object> params,
    File outputParentDir);
```

Bundler Validation and Execution Tips and Tricks

- Validation is strictly optional, not required
- Validation throws errors on failure
  - PlatformNotSupportedException is terminal
  - ConfigurationException may be fixable, check the advice field on the exception

- Execution presumes the params would pass validation
- Pass a copy of your params map, validation and execution may mutate the values

BundlerParamInfo Design Goals

- Adding new parameters after JDK shipment
- Customizing parameters on a per-bundler basis
- Support String based config (where it makes sense)
- Customizable defaults via Java Code (lambdas)

BundlerParamInfo Usage

- All config internally is stored in a Map<String, ? super Object>
- Users can pass in Map<String, String>, Map<String, Object> etc to Bundler APIs.
- Bundlers internally delegate to BundlerParams to extract values from the map:

```
public static final StandardBundlerParam<String> APP_NAME = …
Map<String, ? super Object> params = …
//…
String nm = APP_NAME.fetchFrom(params);
```

BundlerParamInfo Anatomy

- Data JavaBeans
  - name - String, a user-friendly name for the param
  - description - String, a user-friendly description for the param
  - id - String, the id used in params map
  - valueType - Class, the type of the value in the map

BundlerParamInfo Anatomy

- Lambda JavaBeans
  - defaultValueFunction - Takes the current params map, returns a default in context of the current params
  - stringConverter - Takes a String and the current params map, converts it into the value object

    Note that the StringConverter is run even if the value is already a String

BundlerParamInfo fetchFrom Method

- For the passed in params map (Map<String, ? super Object)…
  - If the map contains a key for the id of the param…
    - If the value is a String and we have a StringConverter
      - Run the value through the string converter and return it
    - If the value type is the correct type return it
    - Other wise return an exception complaining about the type
  - If no value, and we have a defaultValue lambda, return the results of the default value lambda
  - Otherwise, return null

StandardBundlerParam

- Convenience class for 99% of BundlerParamInfo instances
- Single constructor takes all relevant bean values

```
BundlerParamInfo timeMS =
 new StandardBundlerParam<Long>(
  "Name", "Description", // user facing strings
  "map.key", // key in map
  Long.class, // type
  params -> System.currentTimeMillis(), // default
  (p, s) -> Long.parseLong(s)); // string converter
```

Daemon and Server Installs

Daemon and Service Installer

- Configures the bundlers to create a daemon/service install of the main class
- Supported on
  - Linux DEB and RPM
  - Mac PKG (not DMG or App Store)
  - Window EXE and MSI
- Not supported on disk image installers.

Configuring Daemons and Bundlers

- Set the Bundler Param "serviceHint" to true

```
bundleParams.put(StandardBundlerParam.SERVICE_HINT.getID(), true);
```

- Other BundlerParam options

START_ON_INSTALL	- "startOnInstall"	- default false
STOP_ON_UNINSTALL	- "stopOnUninstall"	- default true
RUN_AT_STARTUP	- "runAtStartup"	- default false

Daemons and Bundlers Tips and Tricks

- Uses same directory layout as an installed application
- Must be “system wide” - no per user install

- Mechanism used:
  - Windows - regular old Windows Service
  - Linux - integrated into /etc/init.d and/or invoke-rc
  - Mac - uses launchctl

Future

All items discussed are subject to change.

Possible Future Features*

- Better Platform Support
- Auto Update
- Auto Memory Configuration
- Reduce Size
- Windows Authenticode Signing
- Jigsaw Integration (Generate small, modular JRE)

* Subject to change

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