Release Notes – PolyScope 6.0

Controlbox Operating System

The base operating system has been updated from Debian 8 32-bit to Debian 11 64-bit.

Docker is now installed to host URCapX containers, which will replace URCap daemons. These containers will not run in privileged mode, so will only have limited access to the Debian OS. Thus these and future changes to the operating system should have no impact on the container based URCaps.

Removed packages

Python 2 has been removed from the OS. If you have a URCap daemon that used python, that daemon should be converted to a URCapX container. The SDK provides a base image including python 3. See the SDK documentation and samples for more details.

Updated packages

The java version on the OS has been updated to Java 17 64-bit. This will affect the Java-based code of URCaps. See the SDK documentation and samples for more details. Any URCap daemons using java will now have to include it in the container.

Security

Upgrade of the base operating system brings latest security hardening mechanisms of Debian Linux and number of fixes to OS vulnerabilities.

Running URCaps in containers enforces principle of least privilege by limiting the direct access of URCaps to the underlying OS.

PolyScope GUI

URCap Software Platform

Compatibility Notice: Existing URCaps are not supported

It is not be possible to install existing URCaps using the old JAR-based packaging file format (`.urcap`) in PolyScope 6. Existing URCaps must be migrated to the new Zip-based packaging file format introduced with this release.

Note that the new packaging format will not be compatible with CB3 robots (running PolyScope 3) and robots running PolyScope 5.

Compatibility Notice: Breaking changes in new Java version

This release upgrades the Java version to the newest long term support (LTS) version, which is Java 17. The Java 17 platform introduces multiple breaking changes which can affect existing URCaps. This might require modifications to the Java code of a URCap to make it successfully compile with the Java 17 compiler.

Compatibility Notice: New package import/export restrictions for PolyScope OSGi bundles

With Polyscope 6 the declaration of provided scope for any Maven dependency in the PolyScope OSGi bundle of a URCap will no longer be allowed, except for the URCap API, Java and the OSGi Core library. URCaps are now required to embed their 3rd party dependencies inside their own JAR.

The concrete package restrictions for the PolyScope OSGi bundles of URCaps are as follows:

- The bundles can not declare any Export-Packages
- The bundles can only declare Import-Packages on this small subset of Java packages:
  (* means that any sub-package is also allowed)
    - `java.*`
    - `com.ur.urcap.api.*`
    - `org.osgi.framework.*`
    - `javax.*`
    - `org.ietf.jgss`
    - `org.xml.sax*`
    - `org.w3c.dom*`

If a URCap violates the import/export package restrictions, the URCap will not install on PolyScope 6.

This change is implemented to make each URCap more self-contained and isolated as well as to help to ensure better compatibility with multiple installed URCaps.

Compatibility Notice: Breaking Java URCap API changes (not implemented yet)

PolyScope 6 will eventually introduce breaking changes to the Java URCap API where the following will be removed:

- Support for HTML-based URCaps
- Support for native daemons
  (the `DaemonContribution` + `DaemonService` interfaces)
- All deprecated functionality, i.e. all interfaces and methods annotated with
  the `@deprecated` annotation
- Various functionality which is not longer used or relevant

Note: All these breaking changes have not been introduced yet, but they will.

XML-RPC

Added support for transferring structured data types.

Upgraded C++ libraries

New URCap packaging format

This release introduces a new Zip-archive-based distribution/packaging file format for
URCaps. The new file format has the `.urcapx` file extension and replaces the old JAR-
based format (`.urcap`). It adds support for contributing Docker images as well as the
existing PolyScope OSGi bundles supported by the old format.

The old JAR-based packaging format is discontinued and will not be supported by
PolyScope 6 and the corresponding URCap SDK. This means that existing URCaps will
not be installable on PolyScope 6. The existing URCap SDK (most recent version is
1.13.0) must be used to develop URCaps for older PolyScope versions.

Support for Docker contributions

One of the artifacts that a URCap (using the new Zip-based packaging format) can
contain is a Docker image. The intention is to provide an isolated environment (a
Docker container) for running URCap daemons, as well as provide a more scalable
interface for communicating with the daemon.

Any contributed Docker image should be as minimal in size as possible.

Java URCap API

Added support for Docker containers

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  - URCaps can start and stop their Docker container
  - URCaps can query the state of their Docker container
  - URCaps can get the URL for a HTTP-based NGINX endpoint to their Docker
    container

- URCaps can query the heath status of their Docker container, if the Docker image has defined a custom health check
- URCaps can access the port mapping of their Docker container, i.e. get the host port number assigned to the Docker container for a specified alias
- API changes:
    - New `com.ur.urcap.api.contribution.docker` package

URCap SDK

The previous SDK have been replaced with a new one. It is now based on Docker, both as a container to develop your URCap in, and to launch the Universal Robots offline simulator (URSim).

Note: This SDK can only be used to develop URCaps for PolyScope 6. Use the existing URCap SDK (most recent version is 1.13.0) to develop URCaps for older PolyScope version.

Documentation

The new documentation included as part of the SDK will guide you through the process of installing the necessary tools, building one of the samples, and deploying it into the simulator.

A online-based migration guide is available with instructions on how to migrate an existing URCap to the new Zip-based packaging format as well as migrating a existing daemon to run in a Docker container.

URCap Samples

Added new *Docker Daemon* sample which demonstrates how to create a URCap with a daemon running in a Docker container. The communication between the daemon and the Java part of the URCap (the PolyScope OSGi bundle) is using a HTTP-based NGINX endpoint to the Docker container.

The sample is based on the existing *My Daemon Swing* sample and it shows how to use the following new API features:

- Starting/stopping a Docker container
- Querying the state of a Docker container
- Retrieving the URL for the HTTP-based NGINX endpoint to a Docker container

Changed existing samples:

- Migrated all existing Swing-based to the new Zip-based URCap packaging format
- All the HTML-based samples have been removed, because HTML-based URCaps will no longer be supported by PolyScope 6
- Removed the (CB3/e-Series) robot series compatibility flags from all samples
- Updated all samples to make the PolyScope OSGi bundle self-contained by providing their own dependent libraries instead of those included by the Polyscope. The samples now embed their 3rd party dependencies to comply with new import/export package restrictions.
- Simplified the `pom.xml` file in all samples (has substantially fewer lines now)

Note:

URCaps are no longer required to specify their compatibility with Universal Robots robots from the e-Series and CB3 robot series using the existing compatibility flags in the URCap's `pom.xml` file.

This is because it will not be possible to install URCaps with the new URCap packaging format (`.urcapx`) on CB3 robots.

URSim

There is a new URSim, based on Docker.

Change log

INU	3/28/2023