MATHEMA

Client-side Java in 2019

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What does Java on the client mean?

- A machine with a JRE or JDK
- Used to run an application written in Java
- Focus on the frontend (no Docker images ;-))

Involved technologies and concepts

- Applets
- Web Start
- AWT, Swing, JavaFX
- Java Control Panel and Auto Update

Java Rollout

- To run Applets and Web Start Apps, Java needs to be there first
- End users have to download and install the JRE if Java does not come preinstalled on a machine...
- In the enterprise rollout of the JRE usually is done automatically
- For a long time this was the preferred way of using Java on the client

Bundled JREs

- Products sometimes include a local JRE
  - App and JRE combined in a native installation bundle
  - Not immediately apparent that the app uses Java
- Until recently this might have had unwanted effects
  - No silent installation if end user JRE is used
  - If just files are copied the JRE is not properly registered with the system
  - Huge size of installation package, on the machine and during runtime

Is this still state of the art?

- Still one of the most widely used programming platforms
- App Store-based distribution
  - Android and iOS solely rely on app distribution through app stores
  - Windows and macOS strongly encourage app distribution through app stores
  - Linux uses centralized software repositories, too

Rise of web technologies

- The enterprise has seen a dramatic increase in the use of Web technologies for the frontend of enterprise apps
- End users use web apps a lot

What does this mean for Java?

- A standalone, centrally installed JRE has less advantages than issues
  - How to handle updates?
  - How to handle old apps that do not work with newer JREs?
- Dedicated runtimes allow distribution of Java apps through an app store
  - No need for Java support in the browser
  - Package should contain only what they need

- March 2018 Oracle published a whitepaper detailling its view of Java on the client

Java Client Roadmap Update March 2018 (1/5)

- Public availability of Java SE 8 updates from Oracle until January 2019
- Consumers get updates for personal (non-corporate) use of Java SE 8 through at least the end of 2020
- For commercial use cases Oracle offers subscription plans

Java Client Roadmap Update March 2018 (2/5)

- Applets in Java SE 8 until at least March, 2019, pending continued support by browser vendors, after which they may be removed anytime
- Have been deprecated in Java SE 9
- No longer present in Java SE 11

Java Client Roadmap Update March 2018 (3/5)

- Web Start in Java SE 8
  - For public and personal (non-corporate, non-commercial) use to the end of 2020
  - For commercial use, or when used in conjunction with Oracle products that have a Web Start dependency, through at least March 2025
- No longer present in Java SE 11

Java Client Roadmap Update March 2018 (4/5)

- JavaFX fixes will continue to be supported on Java SE 8 through March 2022 for commercial customers
- No longer present in Java SE 11

Java Client Roadmap Update March 2018 (5/5)

- Swing and AWT will continue to be supported on Java SE 8 through at least March 2025
- On Java SE 11 (18.9 LTS) through at least September 2026

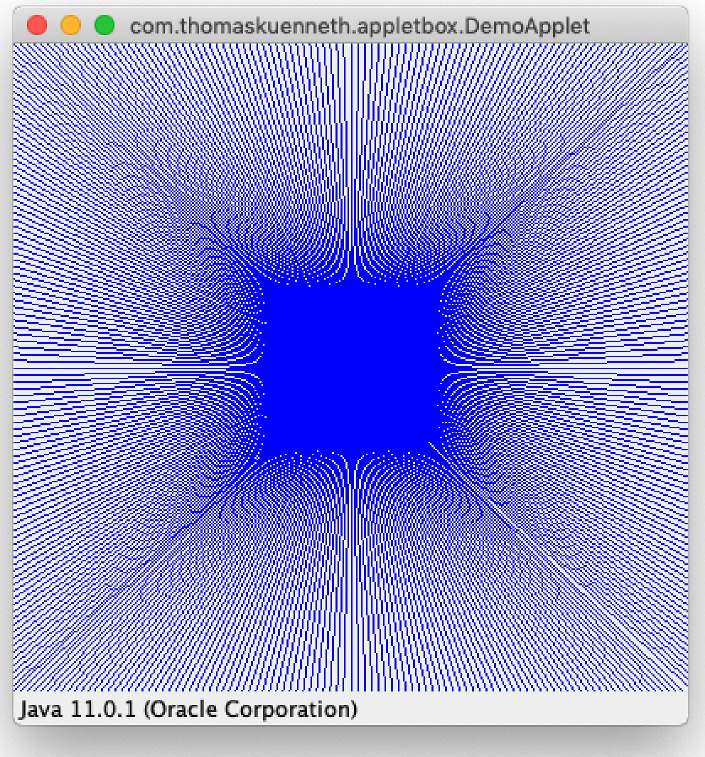
Immediate consequences

- Decide how long to stay with Java SE 8
  - Allows the continued use of Web Start (and Applets if a supporting browser is available)
  - Decide which Java SE 8 to use (Oracle or other vendors)
  - Corresponding licensing terms must be met
- Develop a plan how to migrate to Java SE 11
  - Find alternatives for Applets
  - Find alternatives for Web Start

- Rethink your client strategy

Applets on Java SE 11

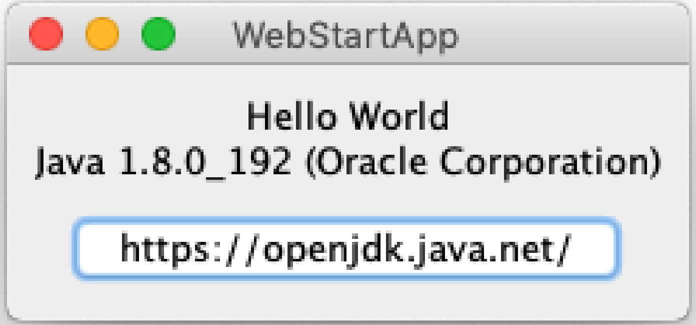
- Support for applets is gone regarding the browser plugin and the appletviewer tool
- Related classes und interfaces are still present
- If needed, a simple applet viewer can be built easily



Java 11.0.1 (Oracle Corporation)

Web Start on Java SE 11

- Web Start executable (javaws) no longer present in Java SE 11
- Generally a Web Start App can be launched through java –jar ...



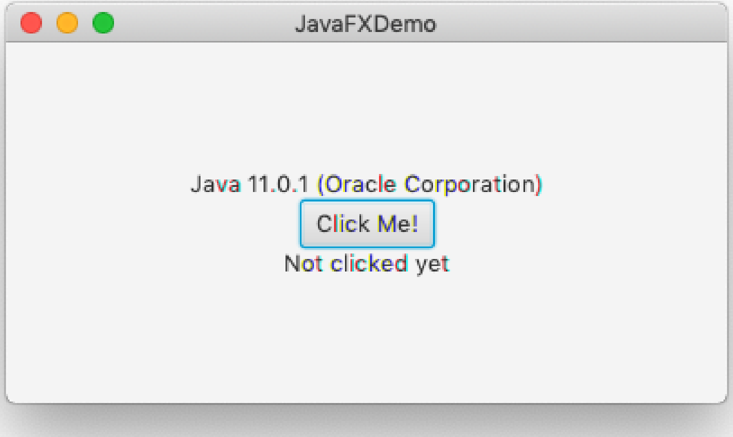
Hello World
Java 1.8.0_192 (Oracle Corporation)

Mind the JNLP API

- Access the user's file system through FileOpenService and FileSaveService
- SingleInstanceService helps deciding how to handle arguments when multiple instances of the App are launched
- BasicService helps showing web pages
- ...

JavaFX

- Actively developed through the OpenJFX open source project
- JavaFX11 Builds ready for download at https://openjfx.io/
  - JavaFX SDK for Windows, Linux and macOS
  - JavaFX jmods for Windows, Linux and macOS
- Integration into existing projects is easy
  - By referencing JavaFX jmods
  - By including JavaFX artefacts in a pom.xml



Java 11.0.1 (Oracle Corporation)

Not clicked yet

JavaFXPackager

- Was used to package Java/JavaFX apps
  - Could create self-contained apps
  - Could create native install bundles
- Was later renamed to JavaPackager
- Not present in Java SE 11
- Not present in JavaFX 11 SDK (see JDK-8203379)

Prospective Packaging Tool

- Will take a Java application and a Java Runtime image as input
- Will produce a Java application image that includes all the necessary dependencies
- Will additionally produce a native package
- JEP 311: Java Packager API & CLI (withdrawn)
- JEP 343 shall...
  - support native packaging formats to give the end user a natural installation experience (msi/exe, pkg/dmg, deb/rpm)
  - allow launch-time parameters to be specified at packaging time
  - be invokable directly, from the command line, or programmatically (ToolProvider API)

Immediate solutions

- Use javapackager from JDK 10
- „Roll your own“ (JEP 220: Modular Run-Time Images)
  - Created by using Java Linker (jlink) since Java SE 9
    - Customized subset of JRE
    - Based on the individual needs of the applications
  - Works only with modules
  - Modules must contain a module-info.java
  - Related tools: jdeps, jmod
  - Will need additional native packaging solutions

Wrap up

- Need to decide whether to...
  - ...stay with Java 8 and possibly pay support fees
  - ...move to Java SE 11
- Develop a strategy for the future

Other removals and deprecations

- CORBA and Java EE modules
- Pack200 tools and API (deprecated)
- Classes, methods, properties, files, fonts, ...
- Subtle changes, possibly hard to find
- Just because it compiles does not mean it will work as intended

- Modernizing software is usually costly and time-consuming
- New Java SE versions are released every six months
- Just moving to Java 11 may not be enough

Conclusion

- Existing apps...
  - ...can continue to use thier frontend technology
  - ...should use OpenJDK builds under the GPLv2 with the "Classpath Exception"
- Oracle JDK will remain as a LTS offering for commercial use cases
  - Subscription fees may apply
  - Carefully read and understand terms of licenses
- Consider frontends of new apps carefully

- Write your client frontend in Java
  - Convert it to JavaScript
  - Run it inside the browser
  - Bck2Brwsr, TeaVM, Jsweet, ...
- Use other technologies
  - Angular, React
  - Xamarin

Links

- Demos and slides

- The Future of JavaFX and Other Java Client Roadmap Updates
- Faster and Easier Use and Redistribution of Java SE
- Java Is Still Free
- Removed Features and Options

- Thank you!

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