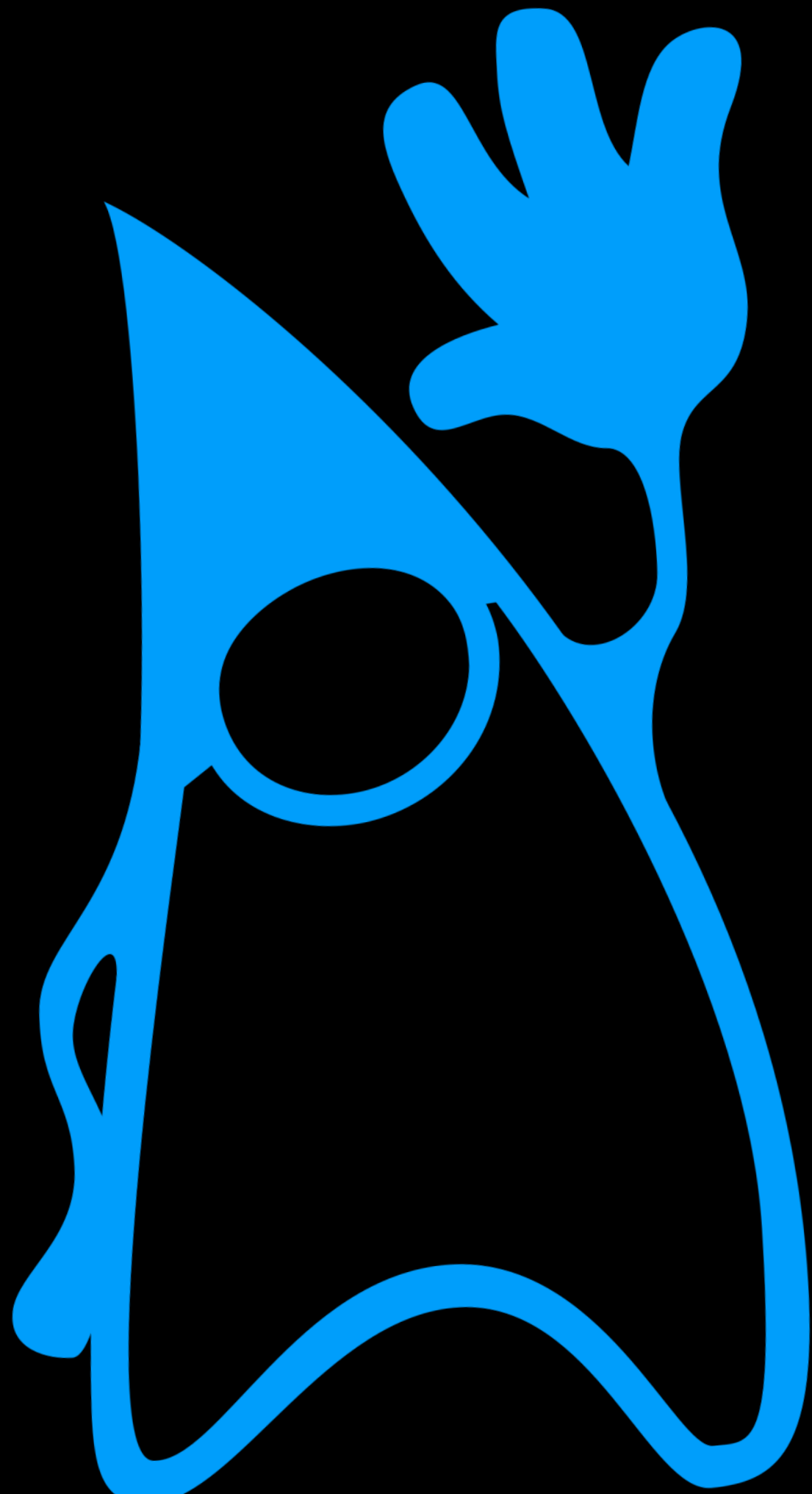


Java 10, 11 & 12



The Netcetera University

2019-05-15 @ ZRH zyp60.right

2019-06-19 @ SKP Alu1

Philippe Marschall & Michael Pellaton

Topics

-  General News
-  Breaking Changes
-  Habits to Stop
-  Habits to Start
-  Further Readings

General News



NCA Java Strategy

- CTO: [Netcetera Java Strategy](#)
- AO: Themas «Platforms & Runtimes > [Java](#)»
- Netcetera wants projects to use the current **LTS** version of Java for **production** (currently 11)
- Netcetera also supports the most **current non-LTS** version for **testing** (currently 12)
- Netcetera support for Java 8 until March 2020, after that SYS will automatically upgrade you to Java 11
- Current packages and base images use Zulu CA

Java Strategy & Thomas TL;DR:

Use Java 11

Java Licences, LTS, ...

Watch the first 40 minutes of the

[NCAU Talk: What's up Java?](#)

Breaking Changes



Use CLDR Locale Data by Default

- Was part of **Java 9**
- Somehow **flew under the radar**
- Techblog: [Unexpected Incompatibilities with Java 11](#)

CLDR Locale Data

- Common Locale Data Repository is the de-facto standard for locale data
- Introduced in Java 8, made default in Java 9

So What?

Locale	Java 8	Java 11
de_CH	1'234'567.80	1'234'567.80
de_AT	1.234.567,80	1 234 567,80

Affects **parsing and printing**

Is this an issue for you?

It depends



How to get the old behavior back

9

`DecimalFormatSymbols#setGroupingSeparator(char)`

or

`java.locale.providers` to a value with
COMPAT ahead of CLDR

or

implement a custom `LocaleServiceProvider`

DecimalFormatSymbols#setGroupingSeparator(char)

- Pro
 - most future proof
 - benefit from CLDR updates
- Con
 - have to find and change every code place
 - hard for 3rd party code

-Djava.locale.providers=COMPAT,CLDR

- Pro

- no code changes required

- Con

- unclear how future proof
- do not benefit from CLDR updated
- JVM option
 - hard in “managed environment” / application server

custom LocaleServiceProvider

- Pro
 - no code changes
 - benefit from CLDR updates
- Con
 - JVM option, JAR on modulepath or classpath
 - hard in “managed environment” / application server

Removal of javah

- The native header generator **jvah was removed**
- The functionality of javah is **now covered** with new functionality in the Java compiler **javac**
- With Maven builds, just pass the -h parameter and the output path to the maven-compiler-plugin

Removal of Common Annotations

- Common annotations (JSR-250) was included with Java 6 (developed for Java EE)
 - @Generated, @PostConstruct, @Resource, ...
- Syncing development of SE and EE was a nightmare
- Deprecated in Java 9
- **Removal in Java 11**
- Mitigation: **add dependencies explicitly**

Removal of Web Service Stack

- Deprecated in Java 9
- Removal in Java 11
 - JAX-WS
 - JAXB
 - JAF
- Mitigation: add dependencies explicitly

Removal of CORBA

- CORBA shares the fate of the web service stack
- Deprecated in Java 9
- **Removal in Java 11**
- Mitigation: **use another CORBA implementation** like the GlassFish-Corba or JacORB

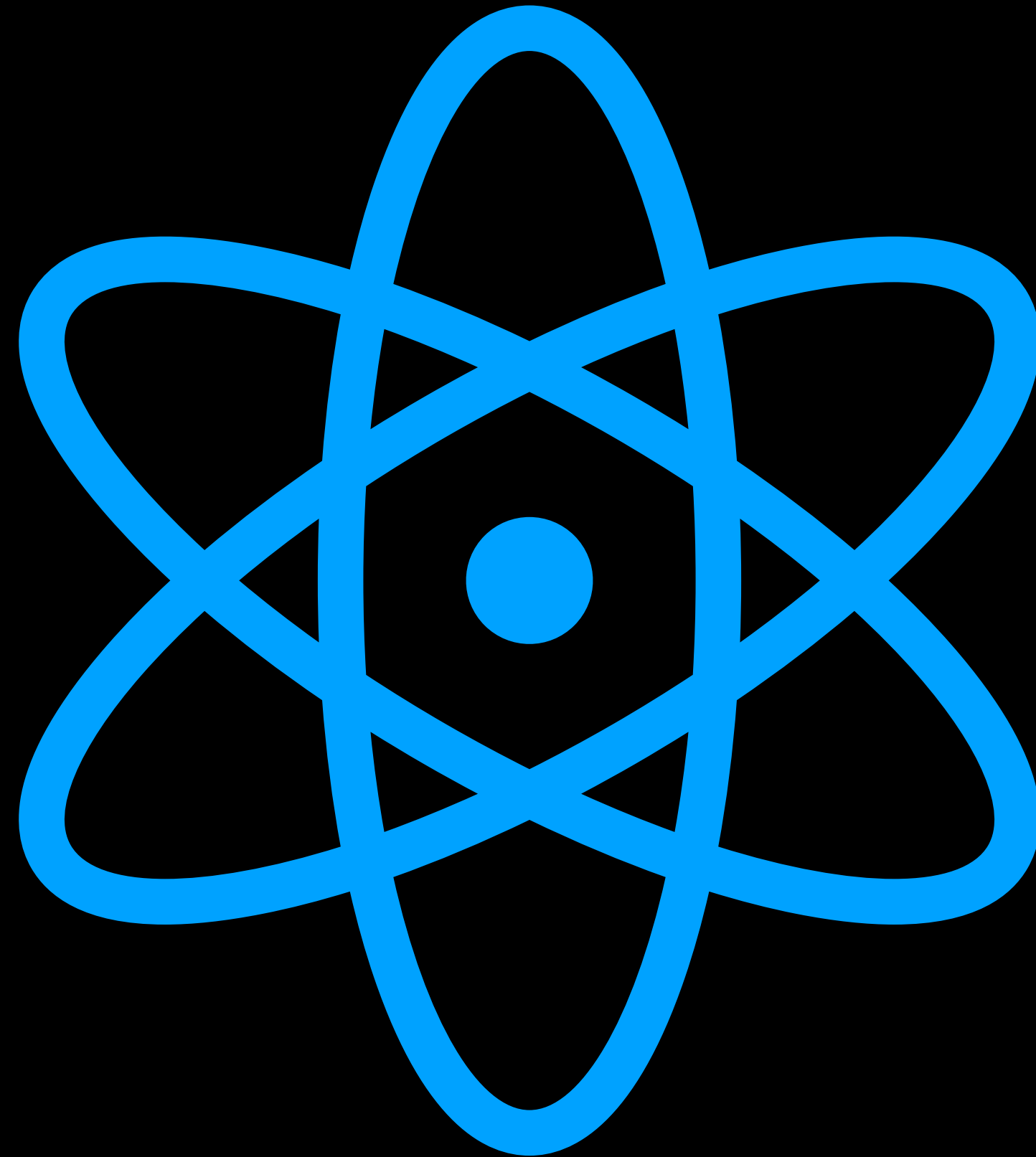
Habits to Stop



Nashorn JS Engine Depreacted

- The **Nashorn JavaScript engine** bundled with the JDK was marked as **depreacted for removal**
- Oracle is unwilling to maintain Nashorn and keep the pace of JavaScript
- Mitigation: migrate to **Rhino**, **Graal.JS** or the **J2V8** V8 bindings for Java

Habits to Start



Local-Variable Type Inference

- Enhanced type inference to reduce boiler plate
- For local variables with initializers including loop variables (Java 10)
- For implicitly typed lambda parameters (Java 11)

var Demo

```
// var can be used for local variables with initializers  
List<String> names = new ArrayList<>();  
var names = new ArrayList<String>();
```

```
// var can be used for loop variables  
for (String name : names) { }  
for (var name : names) { }
```

```
for (int i = 0; i < 10; i++) { }  
for (var i = 0; i < 10; i++) { }
```


So What?

```
Map<String, Map<Class<?>, List<Object>>> entries  
    = aBuilder.build();
```

```
var entries = aBuilder.build();
```

With Lambdas

```
// Java <11: implicitly typed lambda param
IntStream.of(1, 2)
    .map(i -> i * 42)
    .forEach(System.out::println);
```

```
// Java <11: explicitly typed lambda var to annotate
IntStream.of(1, 2)
    .map(@TypeAnnotation int i -> i * 42)
    .forEach(System.out::println);
```

```
// Java >=11: implicitly typed lambda var to annotate
IntStream.of(1, 2)
    .map(@TypeAnnotation var i -> i * 42)
    .forEach(System.out::println);
```

Guidelines

Style Guidelines for Local Variable Type Inference in Java

- Choose variable names that provide useful information
- Consider var when the initializer provides sufficient information to the reader
- ...
- Take care when using var with literals

Launch Single-File Source-Code Programs

- **Single source file** Java **programs** can now be **compiled and run in one step** by **java** without employing **javac**
- The same programs also support the **#!** (shebang) mechanism on **Unixoids**.

```
#!/usr/bin/java --source 11
```

- However, files containing the **#!** must not have the **.java** suffix and are **invalid** when placed in ordinary packages

Launch Single Source Demo



```
$ cat Hello.java
```

```
public class Hello {  
    public static void main(String[] args) {  
        System.out.println("Hello NCAU!");  
    }  
}
```

```
$ java Hello.java
```

```
Hello NCAU!
```

```
$
```

Shebang Demo

```
$ cat shebang
#!/usr/bin/java --source 11
public class Shebang {
    public static void main(String[] args) {
        System.out.println("Hello Shebang!");
    }
}
```

```
$ chmod +x hello
```

```
$ ./hello
Hello Shebang!
```

```
$
```

Java Flight Recorder

- Profiler integrated into JVM
 - Does not rely on byte code transformation
 - Low overhead, can be run in production
- Can be extended with custom events

User Interface

- Java / Zulu Mission Control 7
- Includes JMX browser like VisualVM / JConsole
- Includes interface for jcmd

Download

- Azul Zulu Mission Control 7
- Oracle JMC 7 Early-Access Builds

Demo JFR

- JMX
- Custom chart
- Diagnostic command

Custom Events

- APIs to generate custom events
 - Declarative API
 - Generic API

Create Custom Event Recipe



1. Subclass Event
2. Add annotations
3. Add annotated fields

Supported Data Types

- primitives
- `java.lang.String`
- `java.lang.Class`
- `java.lang.Thread`

Supported Data Types

- Can be annotated for semantics
 - @BooleanFlag
 - @DataAmount
 - @Frequency
 - @MemoryAddress
 - @Percentage
 - @Timespan
 - @Timestamp
 - @Unsigned
 - @TransitionFrom
 - @TransitionTo

Generating Events

new

.begin()

.end()

.commit()

Demo Custom Events

What did I just witness?

- <https://github.com/marschall/jfr-libraries>

Creating Recordings

- Command line: `jcmd`
- Mission Control GUI
- JMX

Java 8 Backports

- Azul Zulu 8u202
- Alibaba Dragonwell 8
- Work on upstream ongoing

(Application) Class Data Sharing

App CDS

Caching

- Speeding up application by not doing the same thing over and over again
- Storing the result for the future

(Application) Class Data Sharing

- Caches result of class loading
 - C++ objects
 - Writes to file
 - Memory maps into application

Double Benefit

- Faster startup
- Smaller footprint
 - Pages shared between JVM instances
 - Important so use same Docker base image

CDS Updated in

- JDK 5
- JDK 9
- JDK 10
- JDK 11
- JDK 12
- JDK 13

CMS

- Not supported
- Habit to stop

Application Class Data Sharing

- AKA App CDS
- Extends CDS to application classes and classes from custom class loaders

-Xshare

- `-Xshare:dump` creates CDS archive
- `-Xshare:off` disables CDS
- `-Xshare:on` require CDS, fail if not possible
- `-Xshare:auto` use CDS if possible

Create Shared Archive

10

- `java -Xshare:dump`
 - by default uses `lib/classlist`
 - by default stored to `lib/server/classes.jsa`
- Default archive ships with JDK 12

Create App CDS Archive Recipe

10

1. Run application with `-Xlog:class+load=debug`
2. Run `cl4cds`
3. Run application with `-Xshare:dump`
4. Repeat every time application or dependency or middleware changes

Conclusion CDS

- On by default in 11
- Default archive in 12 → used by default
- Very easy to use
- Worst case only start up improvements
- Best case additional footprint reduction
- Create default CDS archive on Java 11 installation or Docker image creation

Conclusion App CDS

- Biggest improvement
- Hardest to use
- Probably too much of a hassle
- JEP 350 may make it easier to use

TLSv1.3

TLSv1.3

11+12

- Safer by
 - removing old cruft
 - adding better things
- Faster by
 - shortening handshake

Enterprise TLS

- aka ETLS / eTLS
- allows MITM because snake oil
(mostly US banking industry)

Java Support for TLSv1.3

11+12

- Java 11 only partial support
- Java 12 added support for
 - ChaCha20
 - Poly1305
- Still missing
 - x25519/x448 elliptic curve algorithms, JDK-8171279, fixed in Java 13
 - EdDSA signature algorithms, JDK-8166596, planned for Java 14

Can I use it?

11+12

- who knows

When will I have to use it?

- who knows

Java 8 backport

- Zulu has one
 - details hard to come by
 - some classes in Zulu namespace

Further Readings



See README.md on GitHub

<https://github.com/netceteragroup/ncan-java10-11-12>

FYI

- Java 8 → 11 Migration Experience Reports
- 2019-06-26