Java™

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Welcome to Java9

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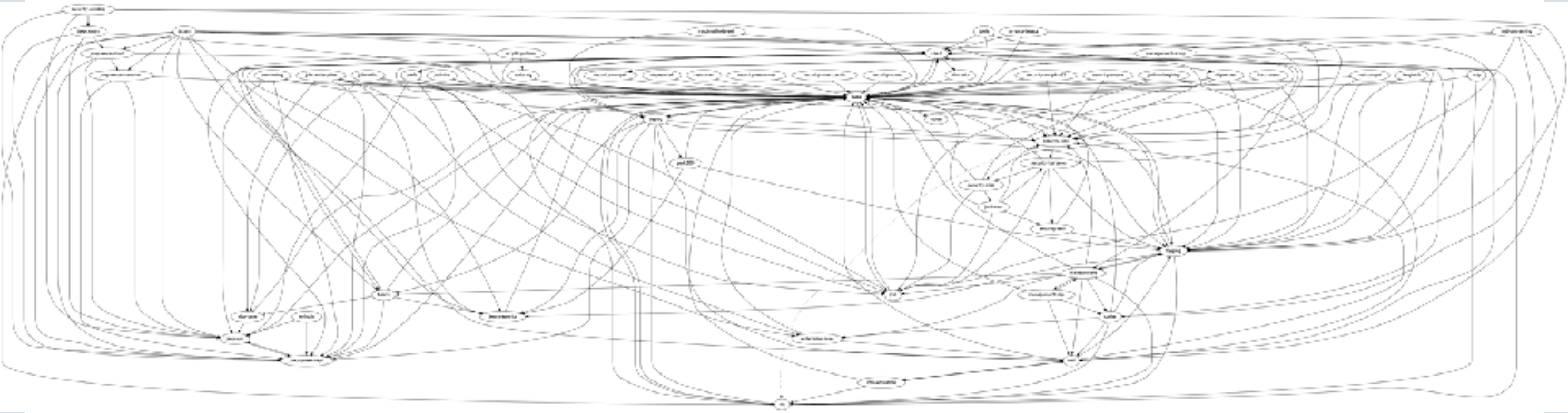
Java
Your
Next
(Cloud)

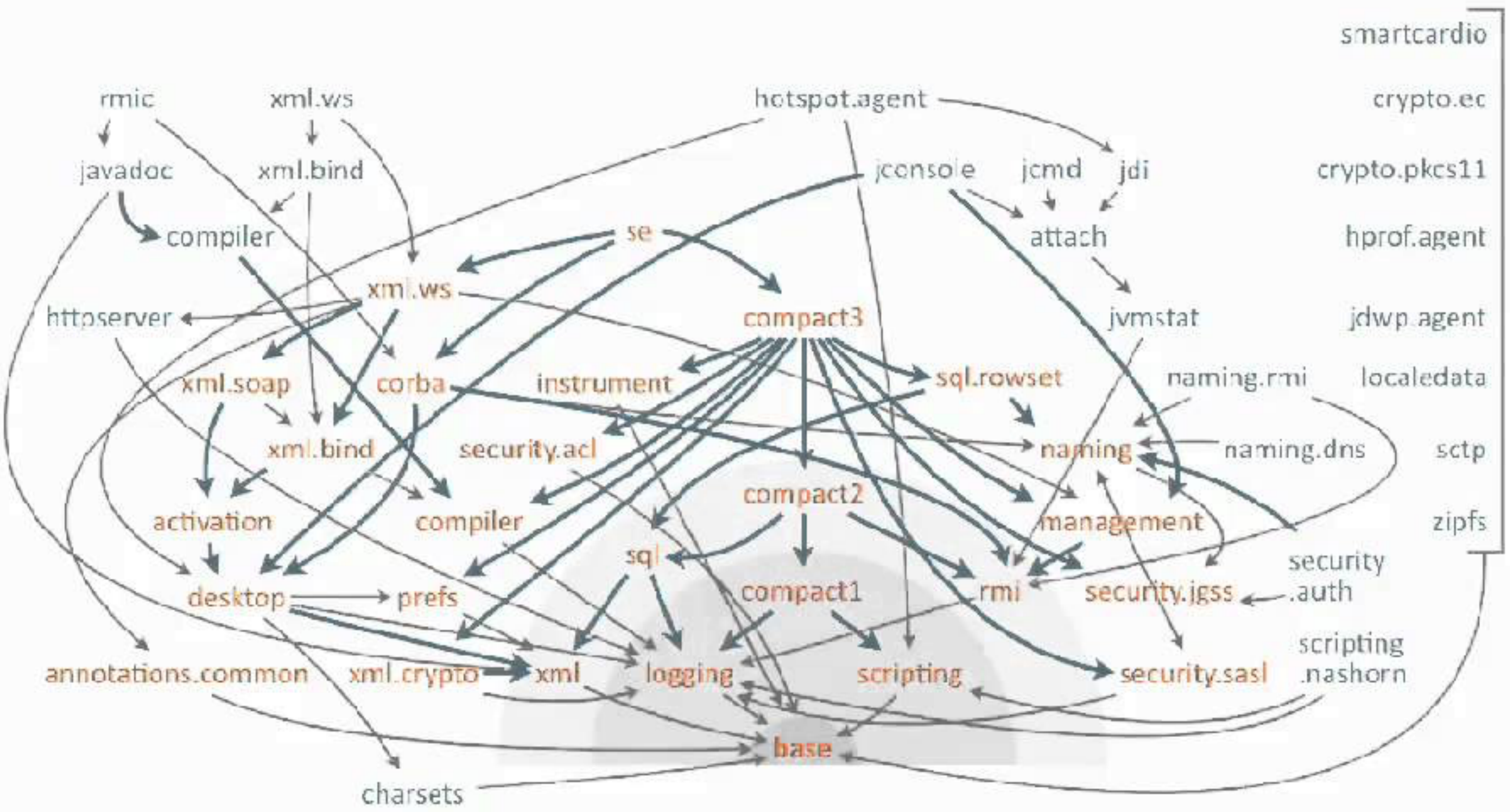
Safe Harbor Statement

Agenda of the day …

1. Welcome to Project Jigsaw
2. Multi-release JAR support
3. Understanding HTTP/2 and Java Stand
4. On the shelf - VM Features, Just update Your JDK
5. Learning tools - Welcome to JShell
6. Final Thoughts

Why Project Jigsaw ?





smartcardio
crypto.ec
crypto.pkcs11
hprof.agent
jdwp.agent
localedata
sctp
zipfs
rmic
xml.ws
hotspot.agent
javadoc
xml.bind
jconsole
jcmd
jdi
compiler
se
attach
xml.ws
httpserver
compact3
jvmstat
xml.soap
corba
instrument
sql.rowset
naming.rmi
xml.bind
security.acl
naming
naming.dns
activation
compiler
compact2
management
sql
security.auth
desktop
prefs
compact1
rmi
security.jgss
annotations.common
xml.crypto
xml
logging
scripting
security.sasl
scripting.nashorn
base
charsets

What is Jigsaw ?

- No rt.jar
- JRE size as per the requirement.
- Solve classpath issue

Multi-release JAR Support

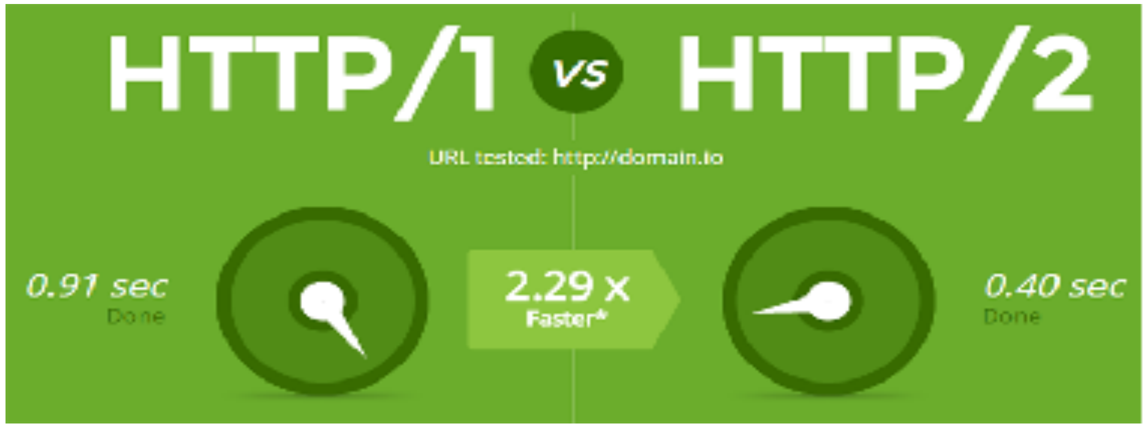
```
jar root
  - A.class
  - B.class
  - C.class
  - D.class
```

```
jar root
  - A.class
  - B.class
  - C.class
  - D.class
  - META-INF
     - versions
        - 9
           - A.class
           - B.class
```

```
jar root
  - A.class
  - B.class
  - C.class
  - D.class
  - META-INF
     - versions
        - 9
           - A.class
           - B.class
        - 10
           - A.class
```

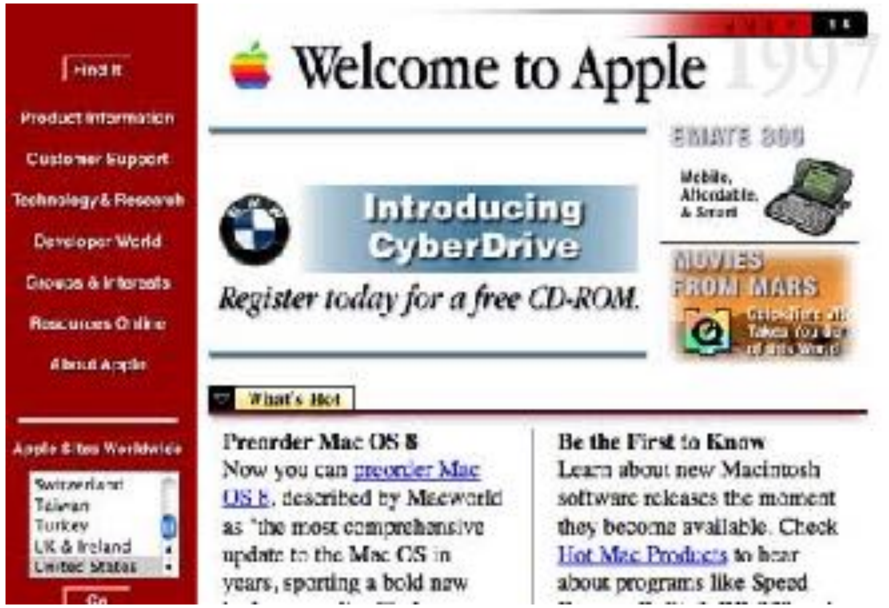
HTTP/2 - What

- Second major version in HTTP protocol.
- HTTP/2 official publication RFC 7540 – May 2015.
- Most of the browser supports HTTP/2.
- Most of the features has been adopted by SPDY protocol (originally designed by Google)



* Report by KeyCDN.com

HTTP/2 : Why



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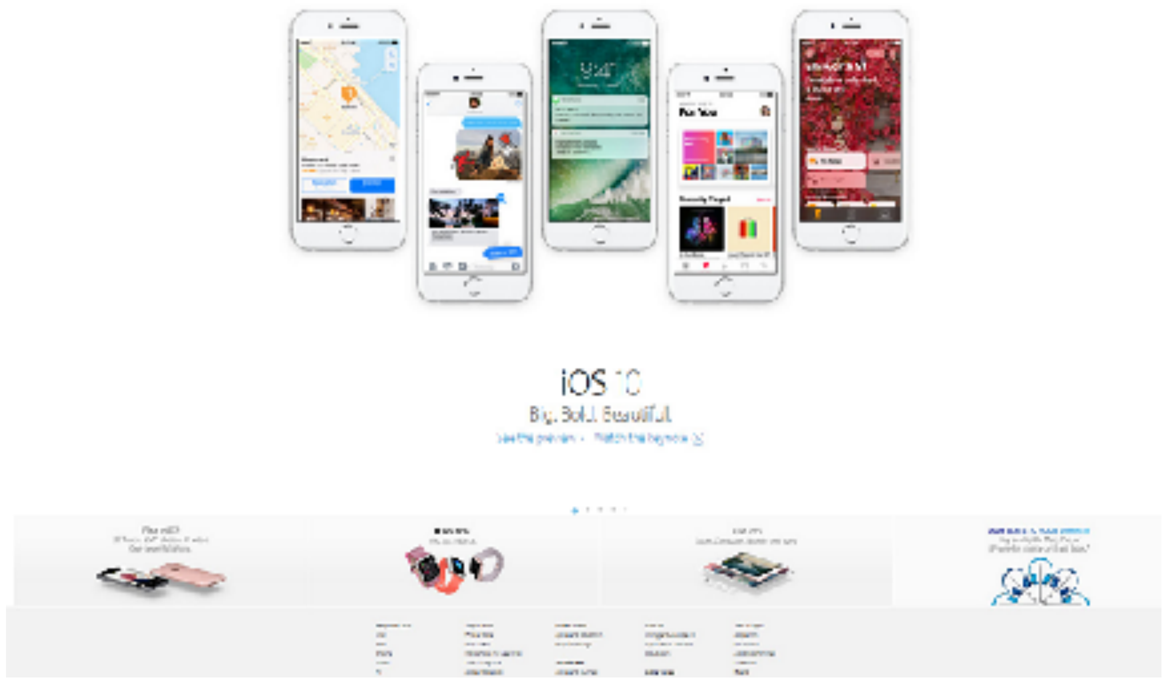
Now you can preorder Mac OS 8, described by Macworld as "the most comprehensive update to the Mac OS in years, sporting a bold new

Be the First to Know
Learn about new Macintosh software releases the moment they become available. Check Hot Mac Products to hear about programs like Speed

A big change in the website design from the time TCP Protocol became standard and today.

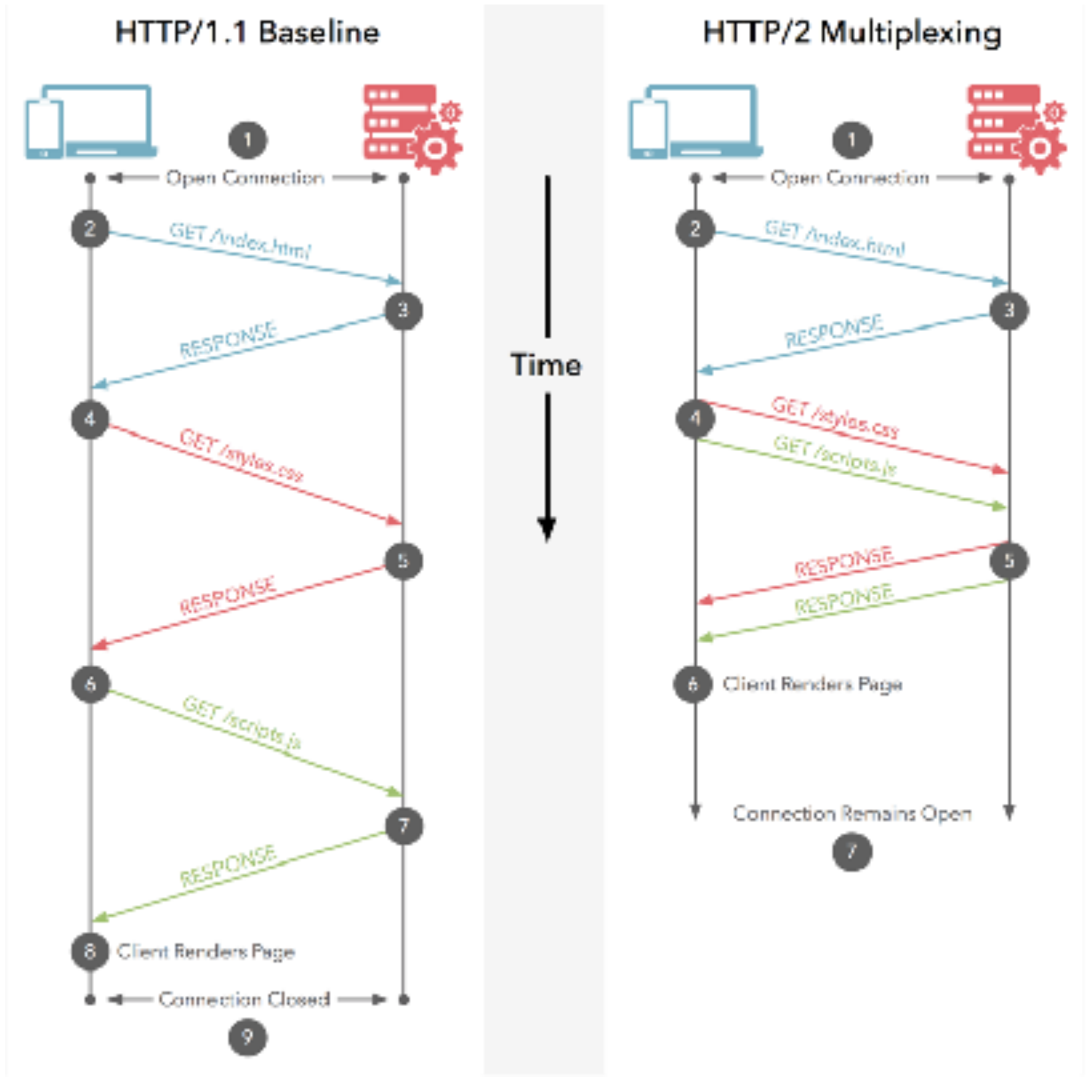


Web exploded !!
AND SO
HTTP Protocol need a change.

HTTP/2 – Why

- No intelligence in HTTP/1
- No multiplexing, no correlation
- We started hacking out old protocols
    - Breaking out HTTP/1 or HTTP/1.1 recommendations
    - Domain sharding, Resource inlining, image spiriting
- We created a layer on top of HTTP Protocol

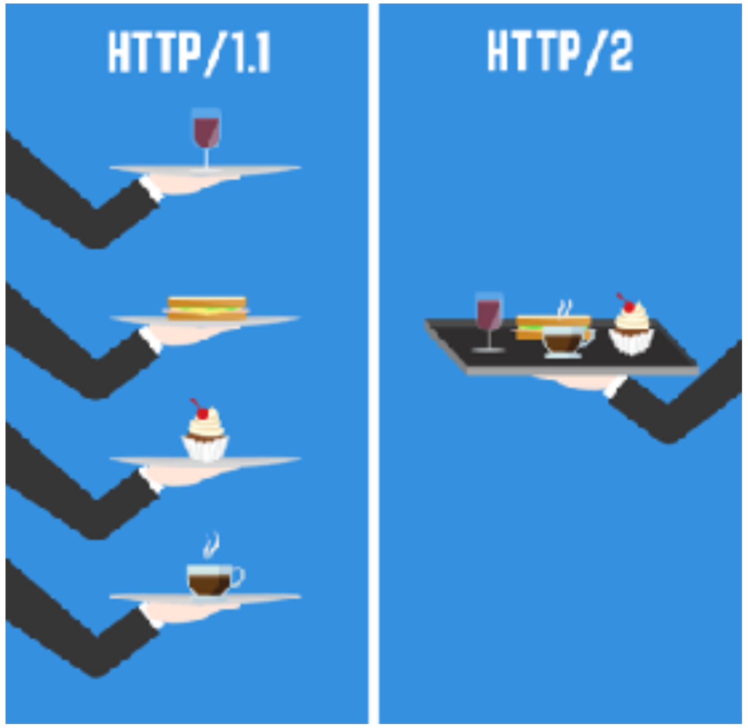
Java & HTTP/2 : Multiple Request



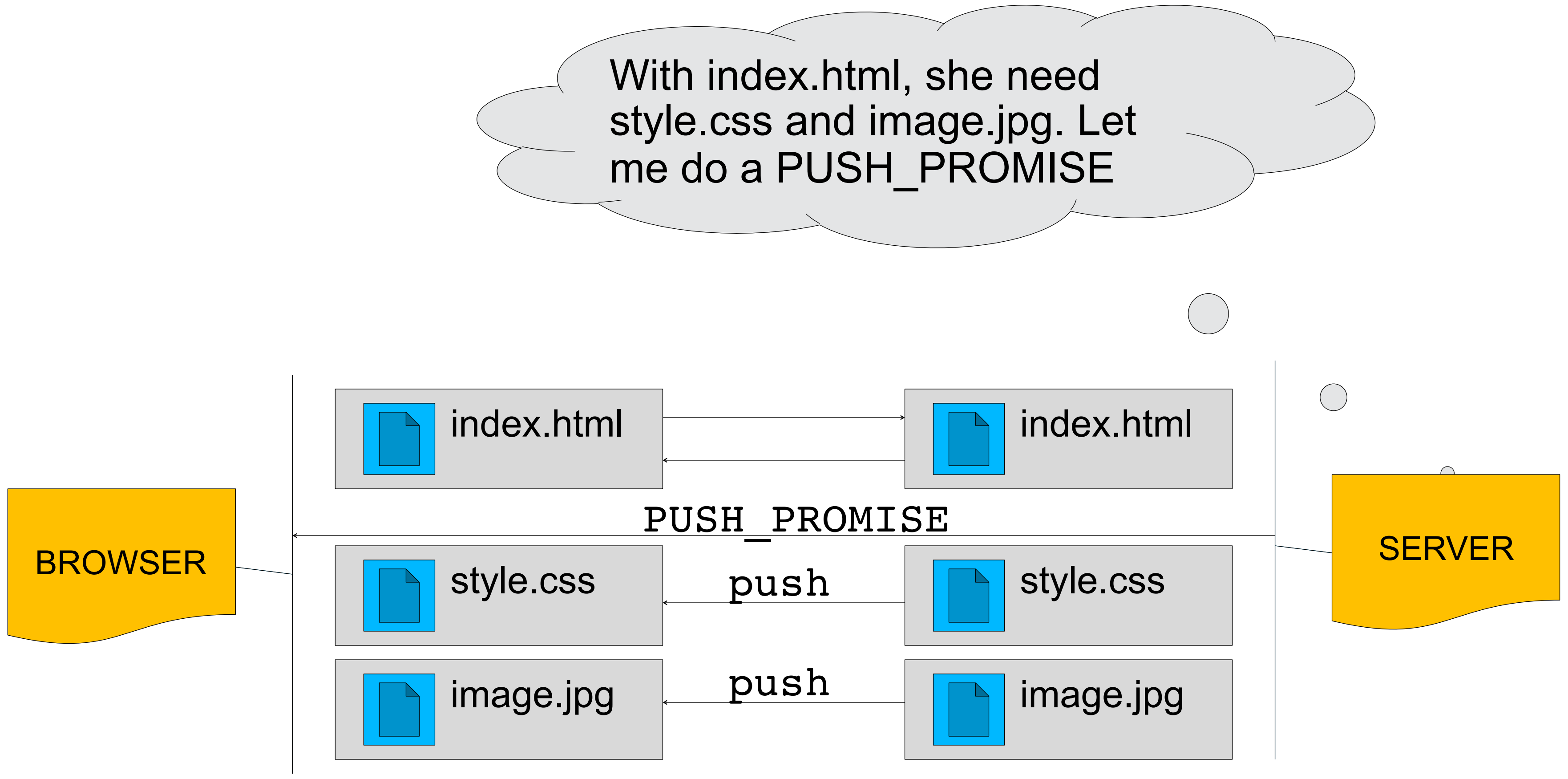
At its core, HTTP/2 is still a request oriented Protocol.

HTTP/2 : Server Push

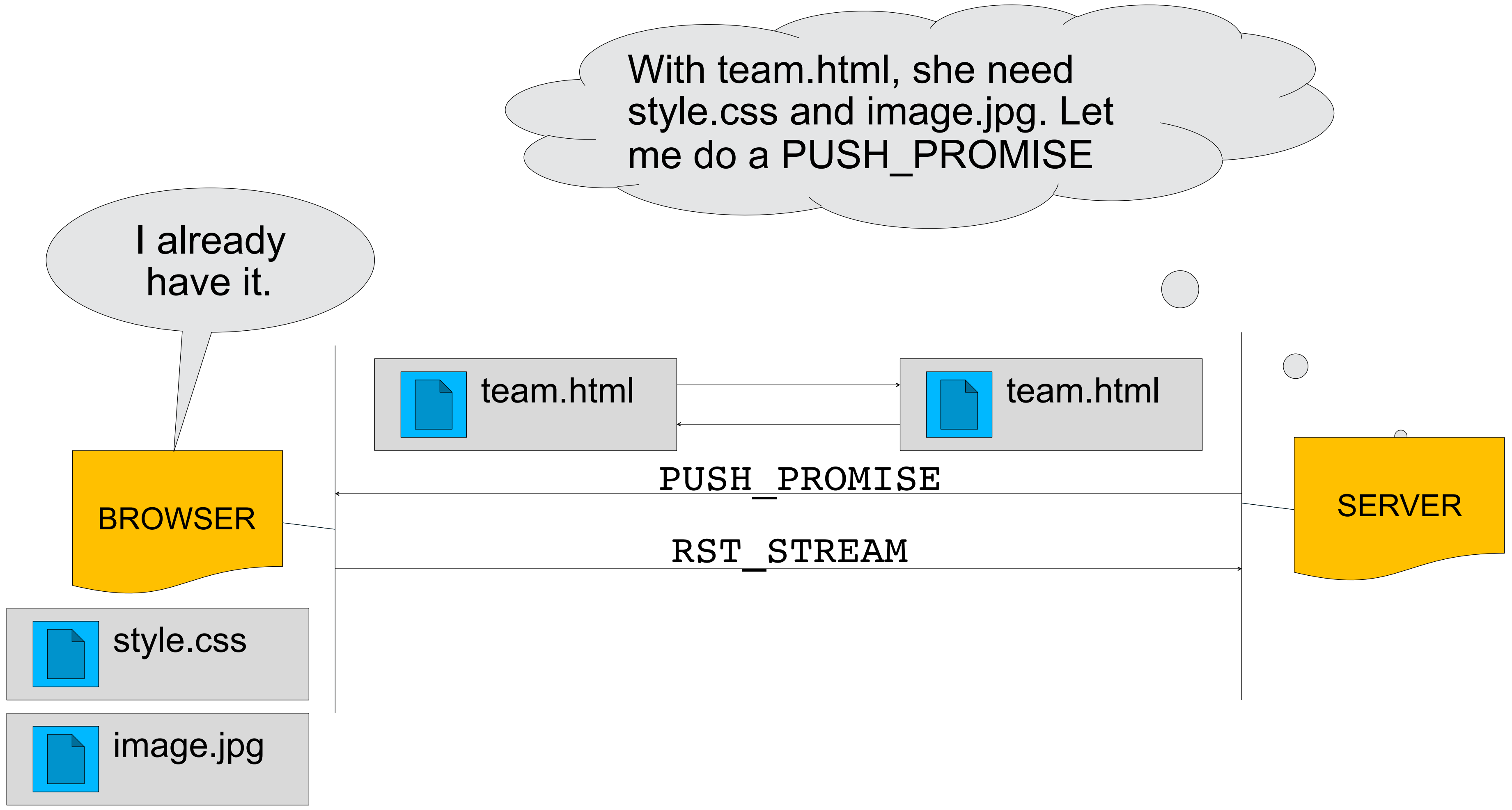
- Server send resources which are expected from client.
- E.g: If client request /index.html and server knows that with /index.html contains a reference for /main.css, it will immediately push main.css without waiting for client request.



HTTP/2 : Server Push – How it works



HTTP/2 : Server Push – How it works (2)



Now this all is possible to do in Java

On the shelf - VM Features, Just update Your JDK

1. Code Cache Segmentation - JEP 197
2. Garbage First (G1) Collector - JEP 248
3. Compact Strings - JEP 254
4. Unified JVM Logging - JEP 158
5. Compiler Control - JEP 165

Code Cache Segmentation - JEP 197

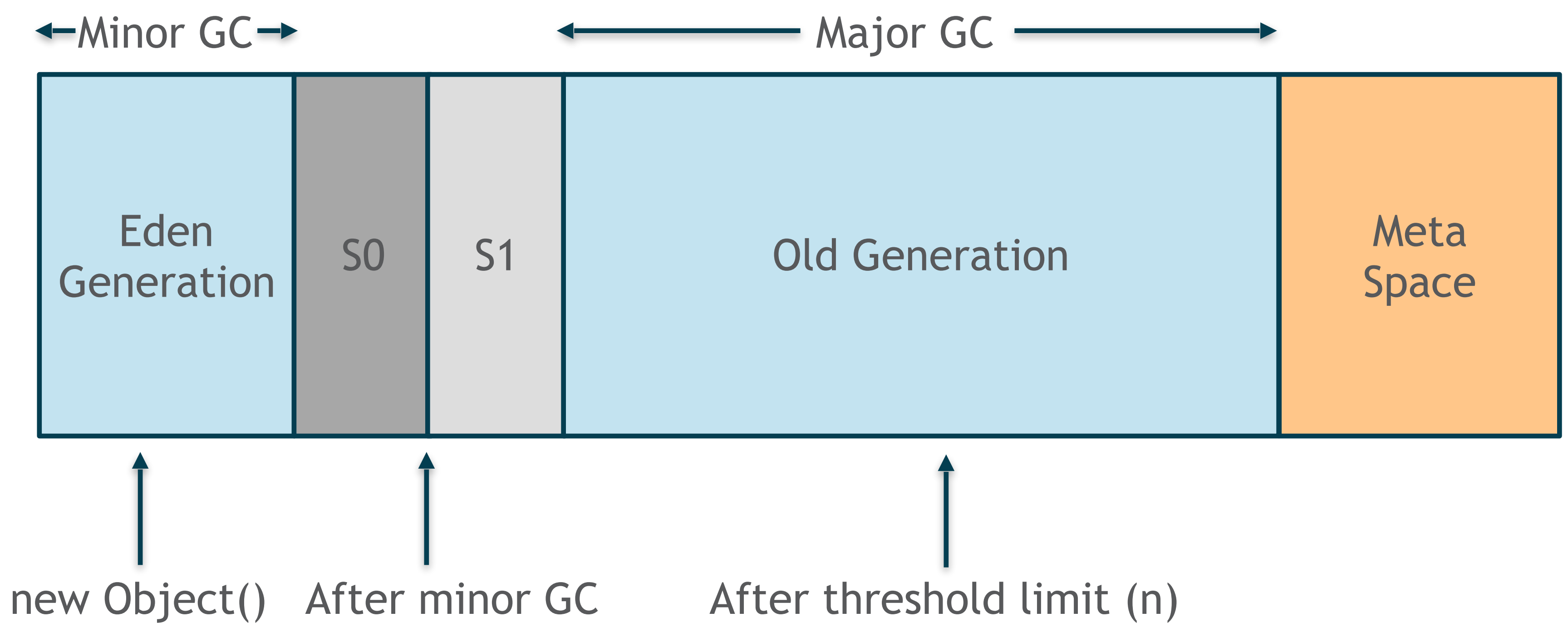
- Lets understand a bit of Runtime Compilers
  - C1, C2
  - Tiered Compilation
- What if code cache is smaller than expected ?
- Pre-Java9 - Code cache was not segmented.
- Code cache segmentation

```
      – ‘non-nmethods’
      – ‘non-profiled nmethods’
      – ‘profiled nmethods’
```

Garbage First (G1) Collector - JEP 248

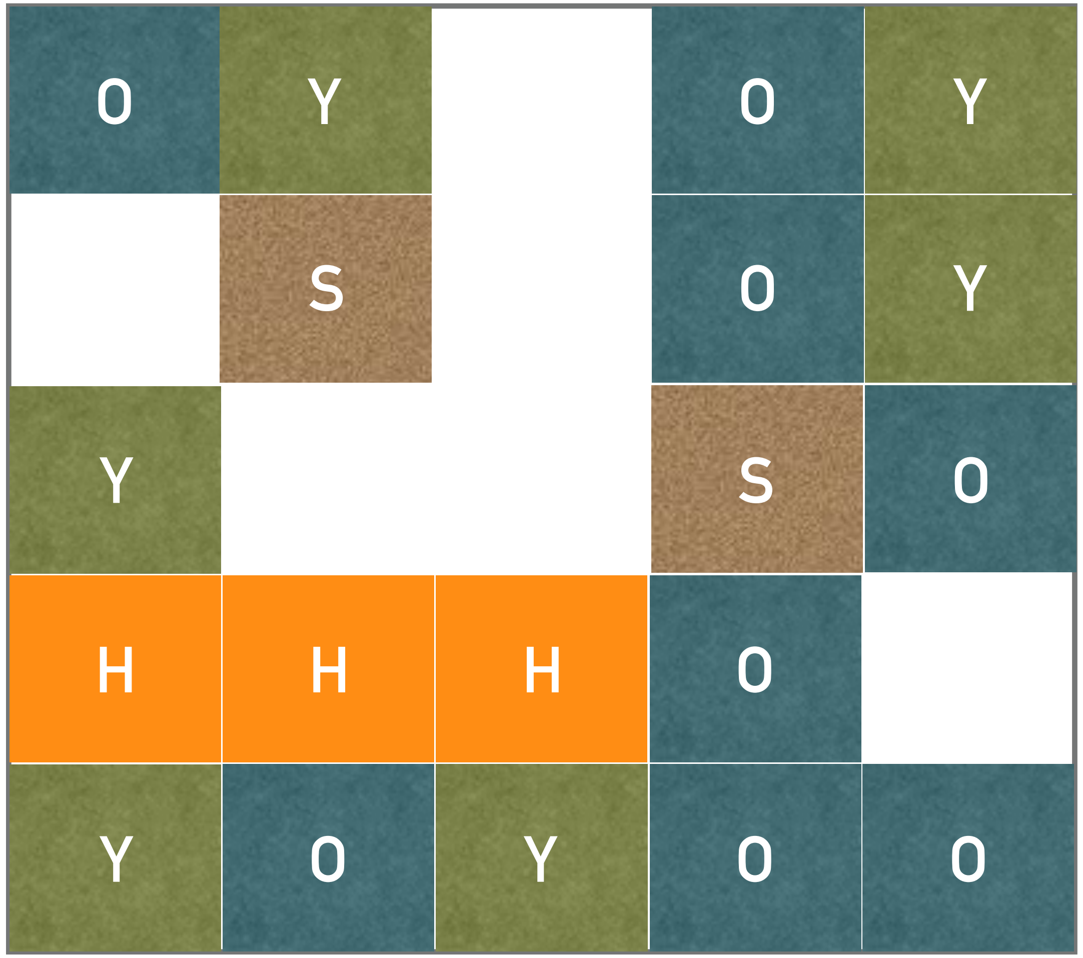
- Default collector in Java9.
- Long time replacement of CMS
- Compacting, Concurrent, Parallel, Stop the World.
- Can be used in Java7 and Java8 as well [use -XX:+UseG1GC].
- G1 Goals
  - Low latency
  - Predictable (Can’t be 100 percent)
  - Easy to use (Less parameter settings)

Java Heap Structure



Weak Generational Hypothesis :
- Most of the object die young.
- There are very few old to young reference.

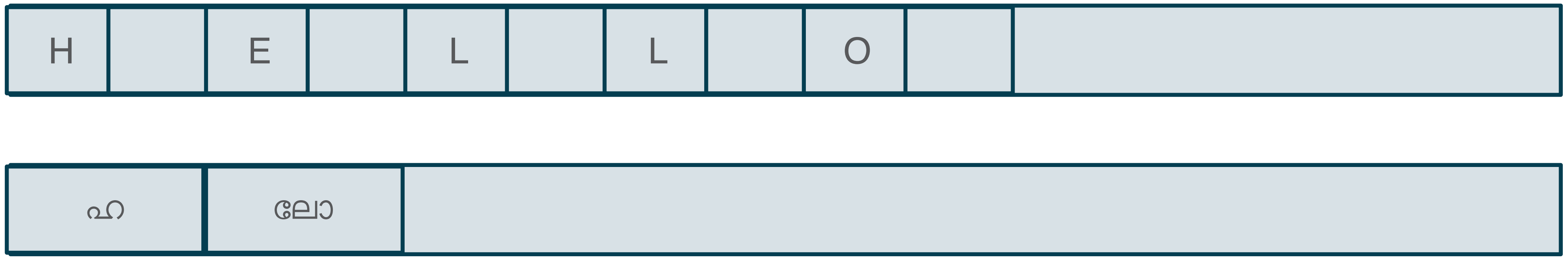
Garbage First (G1) - Memory layout



- Memory is divided into small regions
- More than 2000 regions
- More flexible boundaries
- Use -XX:+G1HeapRegionSize
- Different regions :
  - Young
  - Survivor
  - Old
  - Humongous

Compact Strings - JEP 254

- In general, 20-25 percent of the java heap is String.
- In stead of char[], String is now byte[]
- “coder” field will decide UTF16 or Latin-1
- To disable the feature, use -XX:-CompactStrings
- Performance impact - Minimal



Unified JVM Logging - JEP 158

- Common Command Line option for all logging.
- Logging can use tags (compiler, gc, metaspace, …) and can use levels (error, warning, info, …)
- File rotations to log files.
- Print line-at-a-time
- Some examples :-
  - Xlog:gc*
  - Xlog:disable
  - Xlog:help

Compiler Control - JEP 165

- Fine grained and method context dependent control on JVM Compilers - C1 and C2.
- Ability to change the JVM compiler control at runtime.

```
[
  {
        // pattern to match against class+method+signature
        // leading and trailing wildcard (*) allowed
        match: “apa/Dingo.*",
        c2: {
             // control inlining of method
             // + force inline, - dont inline
             inline : [ "+java/util.*", "-com/sun.*"],
        }
        // applies to all compilers
        // + force inline, - dont inline
        inline : [ "+java/util.*", "-com/sun.*"],
        PrintInlining: true
  }
]
```