



Building a binary distribution of OpenJDK

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Liberica JDK Team

Strong foundation

20 years of history

1997

MCST - Moscow Center of SPARC Technologies
The company worked as a contractor for Sun Microsystems



2004

Sun Microsystems founded its own Development Center in Saint-Petersburg.



2010



Oracle Corp. acquired Sun Microsystems

2017



Open-source contributions



Win

ARM

x86

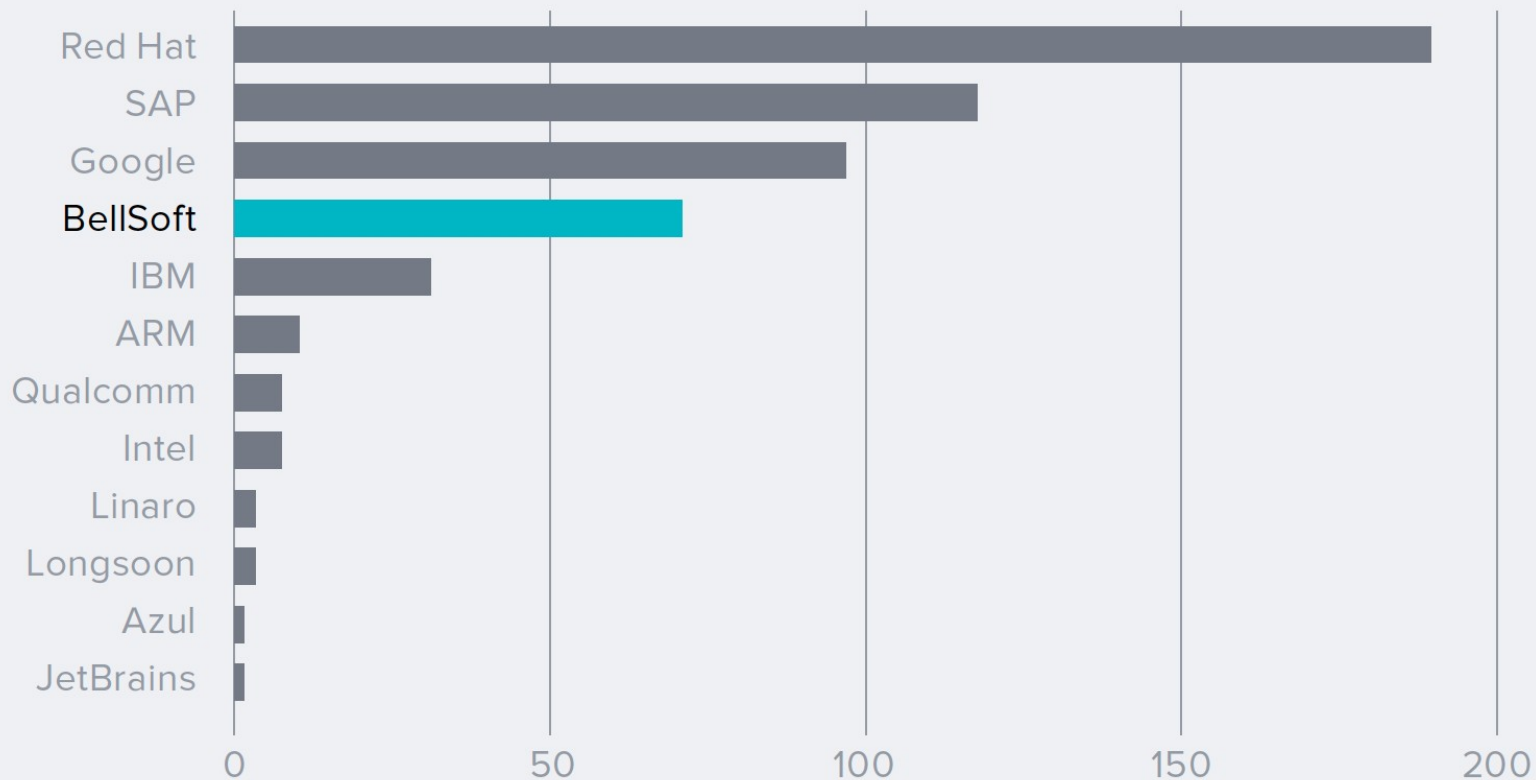
SPARC

We contribute to

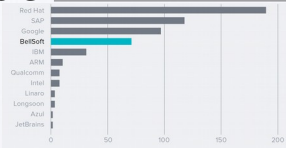


GraalVM™

Number of external contributions to OpenJDK upstream (8.2017 - 8.2018)



Oracle



Why build your own OpenJDK binary?



Liberica JDK binaries history

Oracle decided not
continue to release
binaries for ARM after
JDK8




Oracle announced
JDK11 licence change
and a new release
cadence

Define supported platforms list wisely

- Need hardware to compile, build and test
- It is expensive and worthless to buy it
- Having virtual servers can not give a 100% assurance about tests results and performance measurements
- Solution is hybrid infrastructure: local servers and cloud instances
- To support Liberica JDK several hundreds of servers are in use



There is nothing complex



```
$ hg clone  
$ ./configure  
$ make images
```

Compilers and toolchains

- Compilers in Linux distributions not always yield successful results
- Proper compilers need to be built.
- Using right compilers can give additional benefits
 - Oracle & BellSoft works on moving to gcc 8.
 - Meltdown and Spectre fixes
 - Stability
 - ARM specific gcc improvements



What if we have the proper compiler but build is not successful?

What can we do to fix build process?



Make a hack for your build environment and publish it at GitHub.



Fix OpenJDK build process or toolchain

What can we do to fix build process?




Fix OpenJDK build process or
toolchain



The build is successful!

Test it.



```
$ git clone https://github.com/spring-projects/spring-petclinic.git
$ cd spring-petclinic
$ ./mvnw spring-boot:run
```

It works! You are production ready.



Owners

Name	Address	City	Telephone	Pets
Jeff Black	1450 Oak Blvd.	Monona	6085555387	Lucky
Jean Coleman	105 N. Lake St.	Monona	6085552654	Max Samantha
Betty Davis	638 Cardinal Ave.	Sun Prairie	6085551749	Basil
Harold Davis	563 Friendly St.	Windsor	6085553198	Iggy
Maria Escobito	345 Maple St.	Madison	6085557683	Mulligan
Carlos Estaban	2335 Independence La.	Waunakee	6085555487	Lucky Sly
George Franklin	110 W. Liberty St.	Madison	6085551023	Leo
Peter McTavish	2387 S. Fair Way	Madison	6085552765	George
Eduardo Rodriquez	2693 Commerce St.	McFarland	6085558763	Jewel Rosy
David Schroeder	2749 Blackhawk Trail	Madison	6085559435	Freddy

Why customers hate me?



TCK – Java SE specification compliance guarantee

- TCK is:
 - 500 engineer * years investment
 - 300 pages of documentation
 - 200K+ tests
- Binary TCK verification guarantees compliance with the umbrella Java SE specification and JSRs specific to the particular Java version



Would it be just good to pass TCK?

You **MUST!** To be Java SE spec compatible.

TCK always passes if we build OpenJDK properly?

Wrong statement!

TCK is important

- Issues identified by TCK
 - `java -XX:+UseCompactStrings`
 - Win32 VM test (regression tests passed)
- Any platform can be affected at any time
- Solution: Fix OpenJDK

Compatibility is like pregnancy, you can not be almost compatible.

Only TCK 100% is acceptable.

100% TCK passed!

Are you ready for production?

No.

Regression testing

- jtreg regression test harness
 - 20K + tests. Since 1997
 - Must pass 100%, excluding the exception list
 - Shit happens
 - One of the JTreg tests is red in 1% of runs on one platform.
 - What should we do if we have red tests?
 - Fix OpenJDK



Java Concurrency Stress tests

- jctstress - functional testing for the correctness of concurrency support in:
 - JVM
 - Class libraries
 - Hardware.
- Additional benefit behavioral details of the particular platform



Benchmarks

- Industry benchmarks
 - SPECjvm
 - SPECjbb
- Microbenchmarks



Functional testing

- Testing by application and application tests running
 - Hadoop - HighBench and functional tests
 - ElasticSearch, Lucene
 - If everything is good you are good.
 - What if not? We can not nothing.
- Testing by application tests is a good add-on but can not be a basic quality criteria



What should we test to be sure?

- There are 10^{50} combinations for platforms, binaries and VM parameters.
- We would be happy to test all of them but life is too short.
- The only way is experimental conclusion.



You are ready to deliver

- The delivery is YourJDK.tar.gz
 - Nobody wants you. Eclipse does not work.
 - Linux packages
 - Win installer
 - Mac installer, SDK man
 - Making users happy is invaluable.



Now we are ready to release super high quality OpenJDK binary!

Consider 20 000 open issues in OpenJDK bug tracker.

Support gives protection from rare cases at critical enterprise environment



