Java Instruction Set

marcel.hlopko@fit.cvut.cz

Java Bytecode

Just a byte array, stream of instruction codes together with their arguments

Java Instructions

mnemonics [<param1> <param2> ...] Instructions manipulate the program stack

Conventions

i integer

l long

s short

b byte

c character

f float

d double

a reference

xconst <const>

put constant onto the stack
e.g. iconst 200
shorthands: iconst_1 ...

xload <index>

load x from local variable <index>
onto the stack

xstore <index>

store x from the stack into local
variable <index>

getfield <index>

takes objectRef from the stack and pushes its field val. Field is specified by fieldRef at CP at <index>

putfield <index>

pops objectRef and new value and
stores it into its <index> field
putstatic, getstatic

athrow

pops exception instance and throws it

return, xreturn

returns from the method (xreturn
with TOS)

ifnull <offset>

pops value, if null, then jump
relatively by <offset>

jumps

ifnull, ifnonnull, ifge, ifgt, ifeq, ifne,
iflt, ifle, if_cmple ...

Math

xadd, xsub, xdiv …

Conversions

i2b, i2c, i2d, …

checkcast <index>

checks TOS if its castable to classRef
in CP at <index>

ldc... <index>

push constant from CP

monitorenter, monitorexit

enters/exits monitor :)

invokevirtual, invokestatic, invokeinterface, invokespecial

generally takes methodRef from CP at <index> and invokes it.

and few more

JVM spec is available online, go and read :)

Questions and Discussion