GA144 running C

James Bowman

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C on GA144?

AMERICA SEPTENTRIONALIS IN SUAS PRÆCIPUAS PARTES DIVISA, AD USUM SERENISSIMI BURGUNDIÆ DUCIS

1 micro-op: 7 pJ

1 RAM access: 4000 pJ

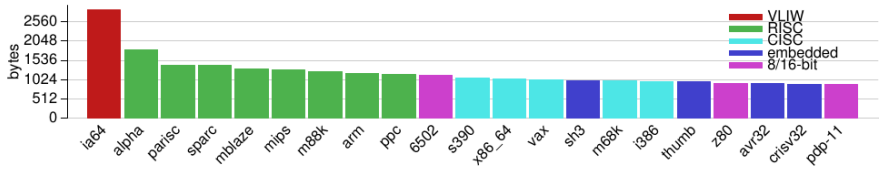


Fig. 2. Total size of benchmarks (includes some platform-specific code, so does not strictly reflect code density)

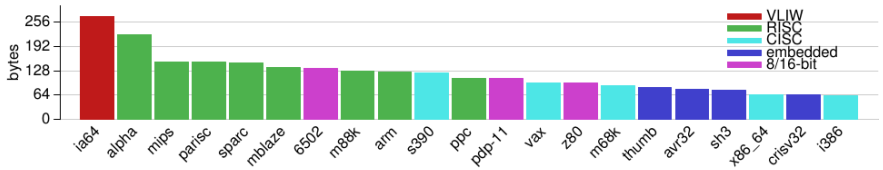


Fig. 3. Size of LZSS decompression code

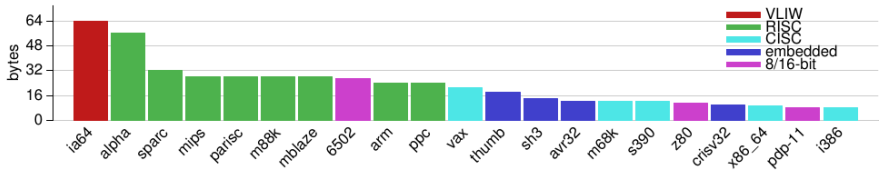


Fig. 4. Size of string concatenation code (machines with auto-increment addressing modes and dedicated string instructions perform better)

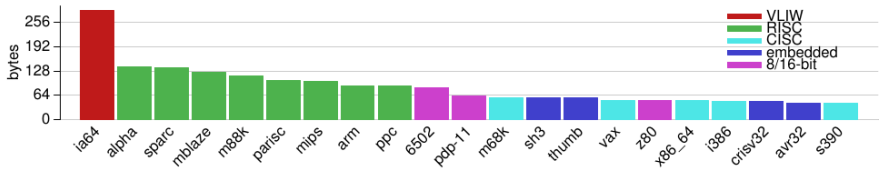


Fig. 5. Size of string searching code (unaligned load instructions help, since four bytes at arbitrary offsets can be compared at once. CISC architectures as well as avr32 and MIPS benefit)

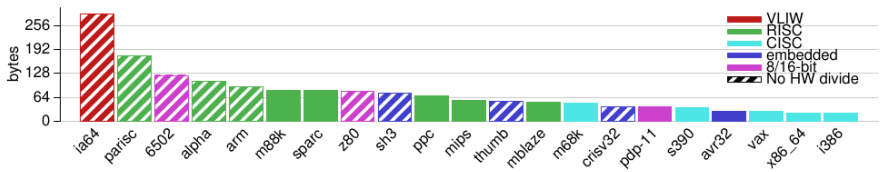
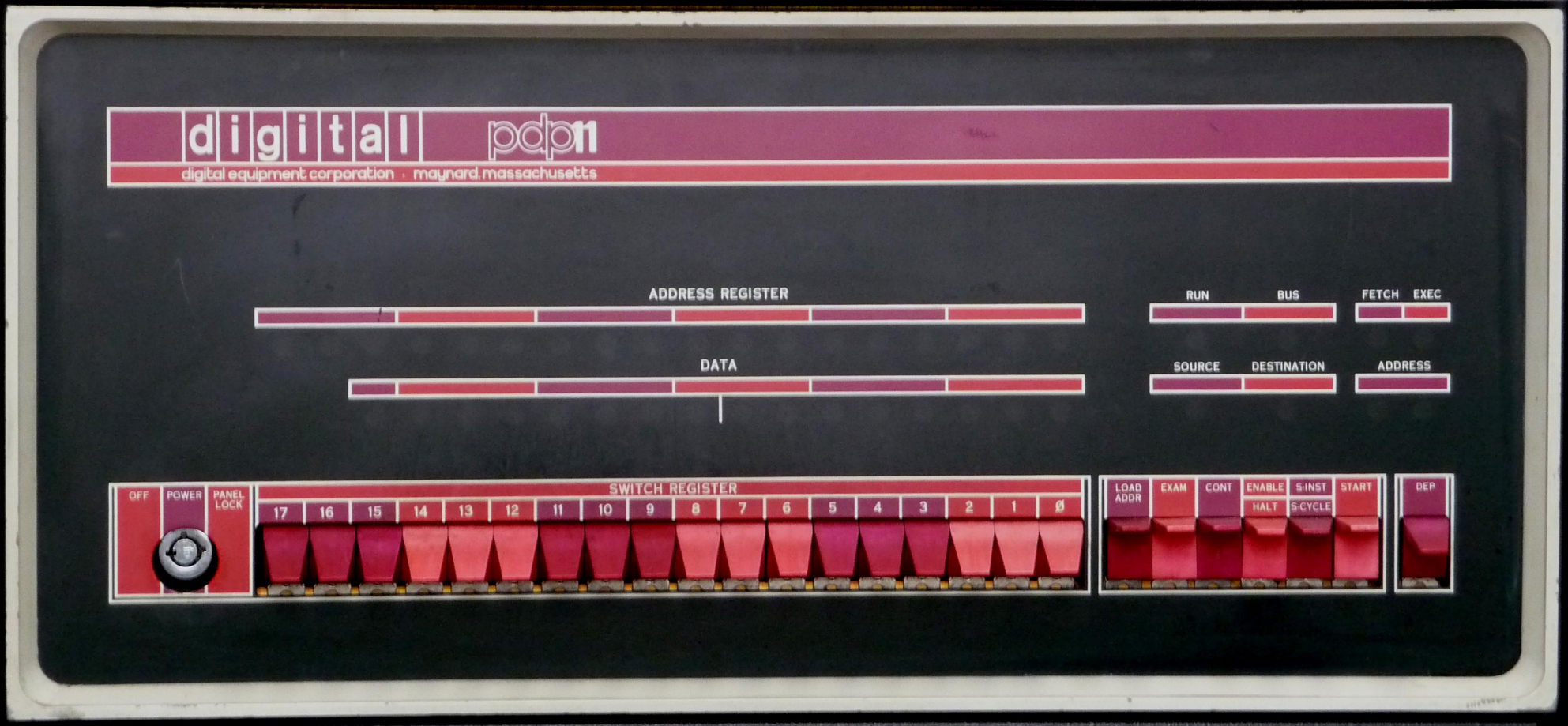
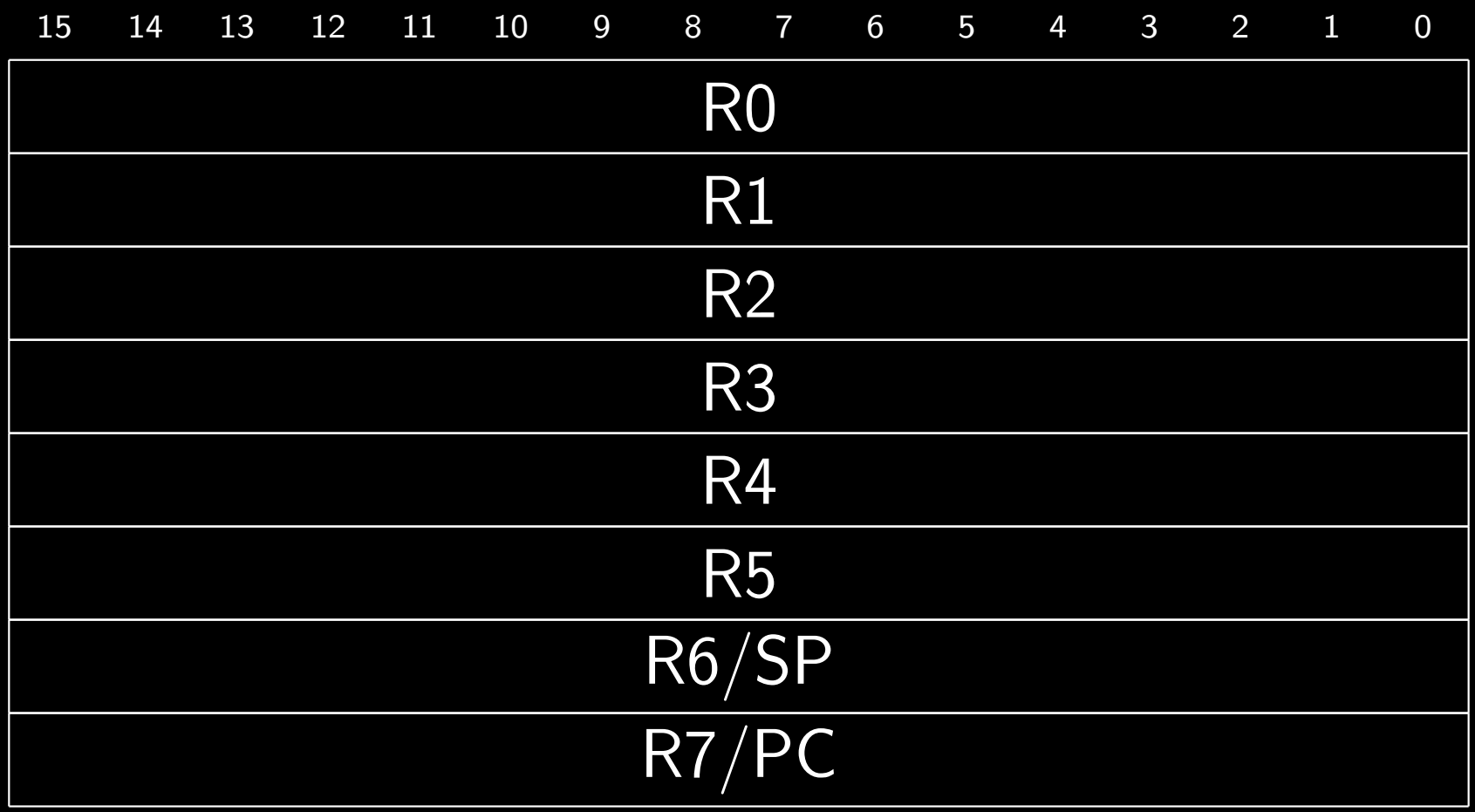
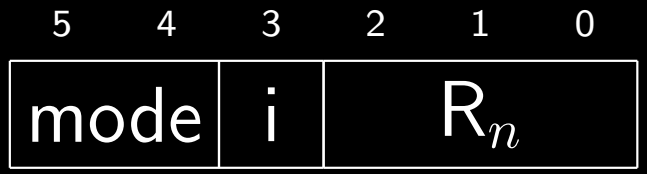


Fig. 6. Size of integer printing code (hardware divide helps code density)


digital pdp11
digital equipment corporation · maynard, massachusetts
ADDRESS REGISTER
DATA
RUN
BUS
FETCH
EXEC
SOURCE
DESTINATION
ADDRESS
OFF
POWER
PANEL LOCK
SWITCH REGISTER
17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 Ø
LOAD ADDR
EXAM
CONT
ENABLE
HALT
S-INST
S-CYCLE
START
DEP


15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
R0
R1
R2
R3
R4
R5
R6/SP
R7/PC


15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
opcode
src
dst



0 R_n
1 [R_n+]
2 [-R_n]
3 [R_n+X]

```
PUSH R0

MOV R0, [-SP]
```

```
POP R0

MOV [SP+],R0
```

```
MOV 123,R0

MOV [PC+],R0
123
```

```
MOV [SP+], PC
```

6-bit field decode:
27 instruction words

using 64 word RAM

registers in 0-7

ADD [R3+],[SP+20]

read, read, math, write

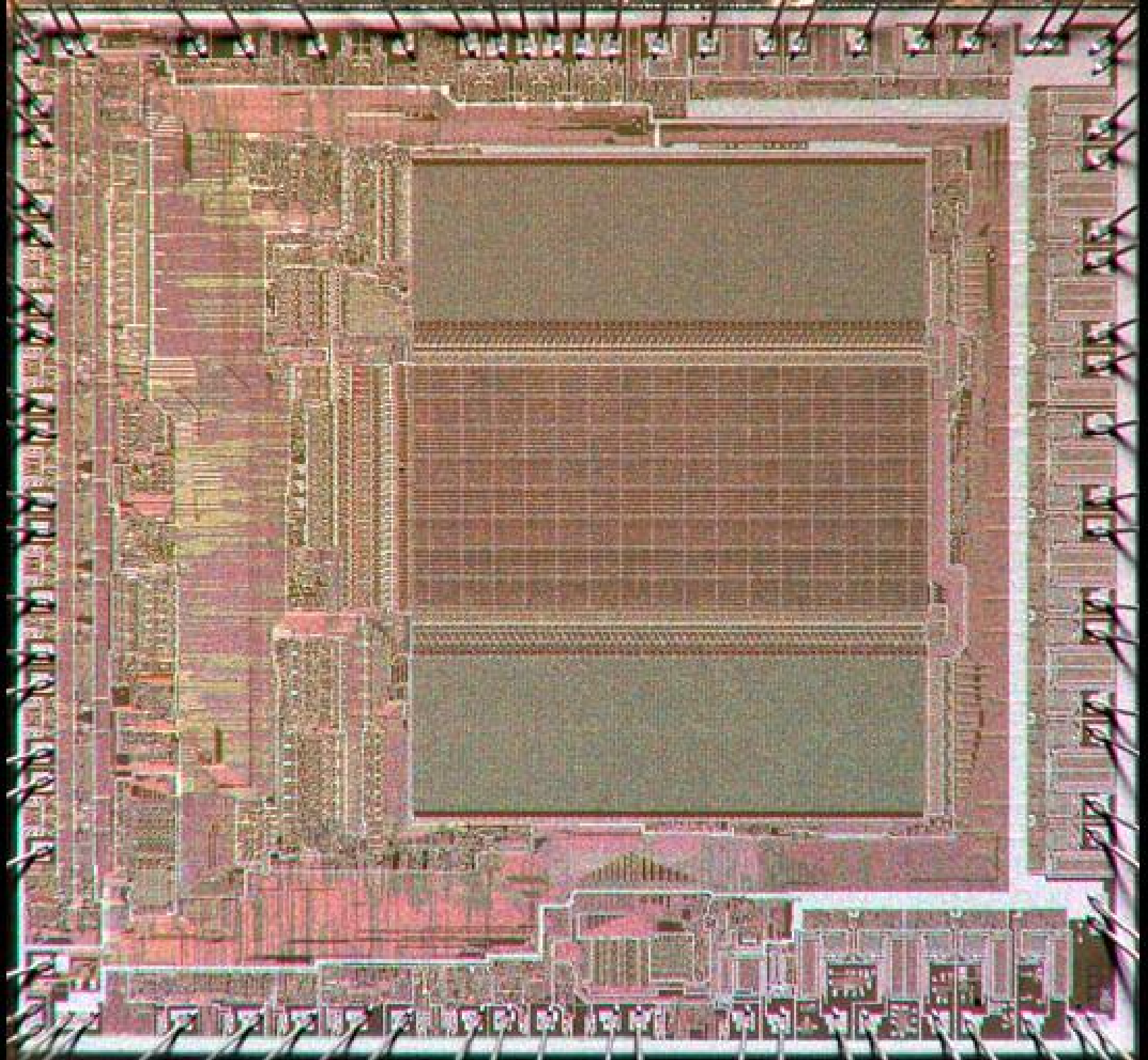
```
ram@ ( addr -- v )
ram! ( v addr -- )
```

```
ram@ ( addr -- v )
ram! ( v -- )
```

```
ADD [R3+],[SP+20]
... ram@ ... ram@ + ram!
```

ADD [R3+],[SP+20]

srcdst + ram!

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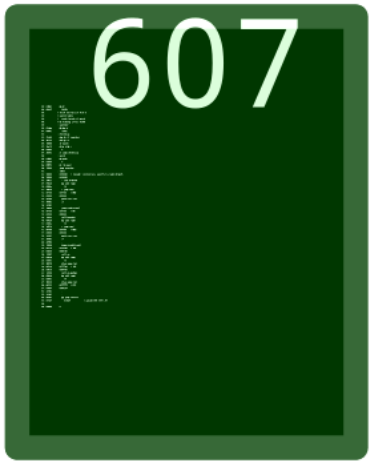
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```
0170000   \ ADD
0060000
  call srcdst
  +
  .
  jump ram!
```

```
0170000   \ MOV
0010000
  call srcdst
  drop
  .
  jump ram!
```


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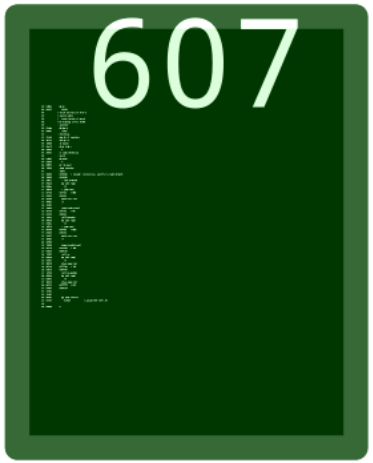
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live demo

hopefully


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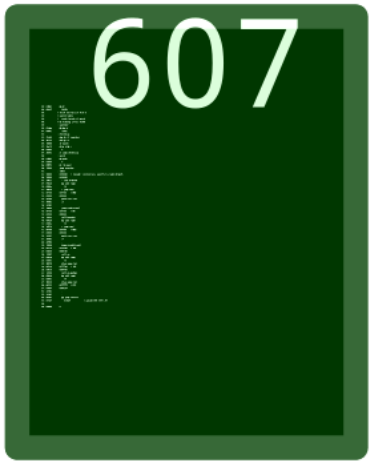
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bytes: too hard

flags: way too hard

orthogonality is good

decode is a waste

C VM is possible