CPU Education: A Hands-On Lesson Plan for Beginners

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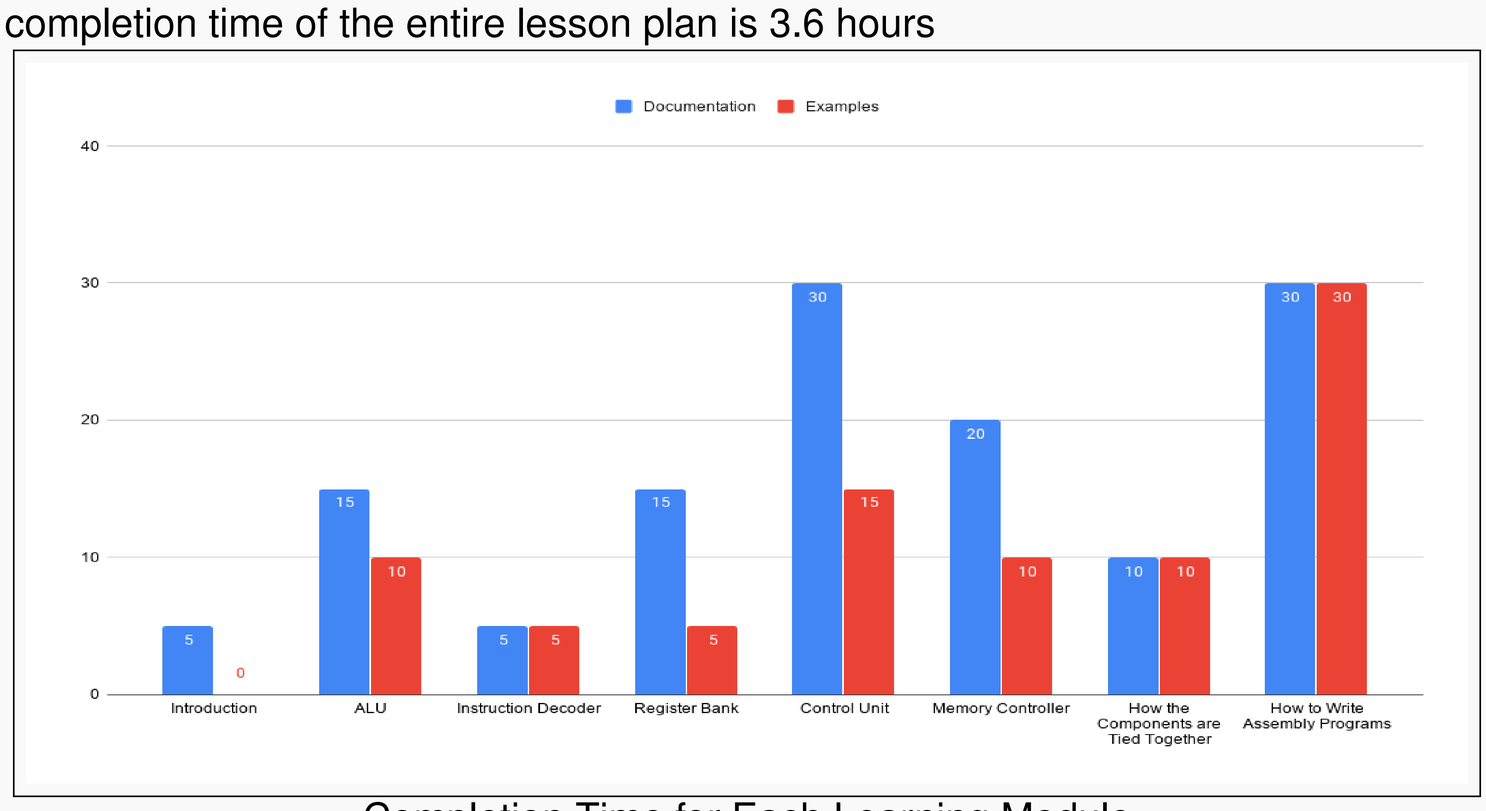
Introduction

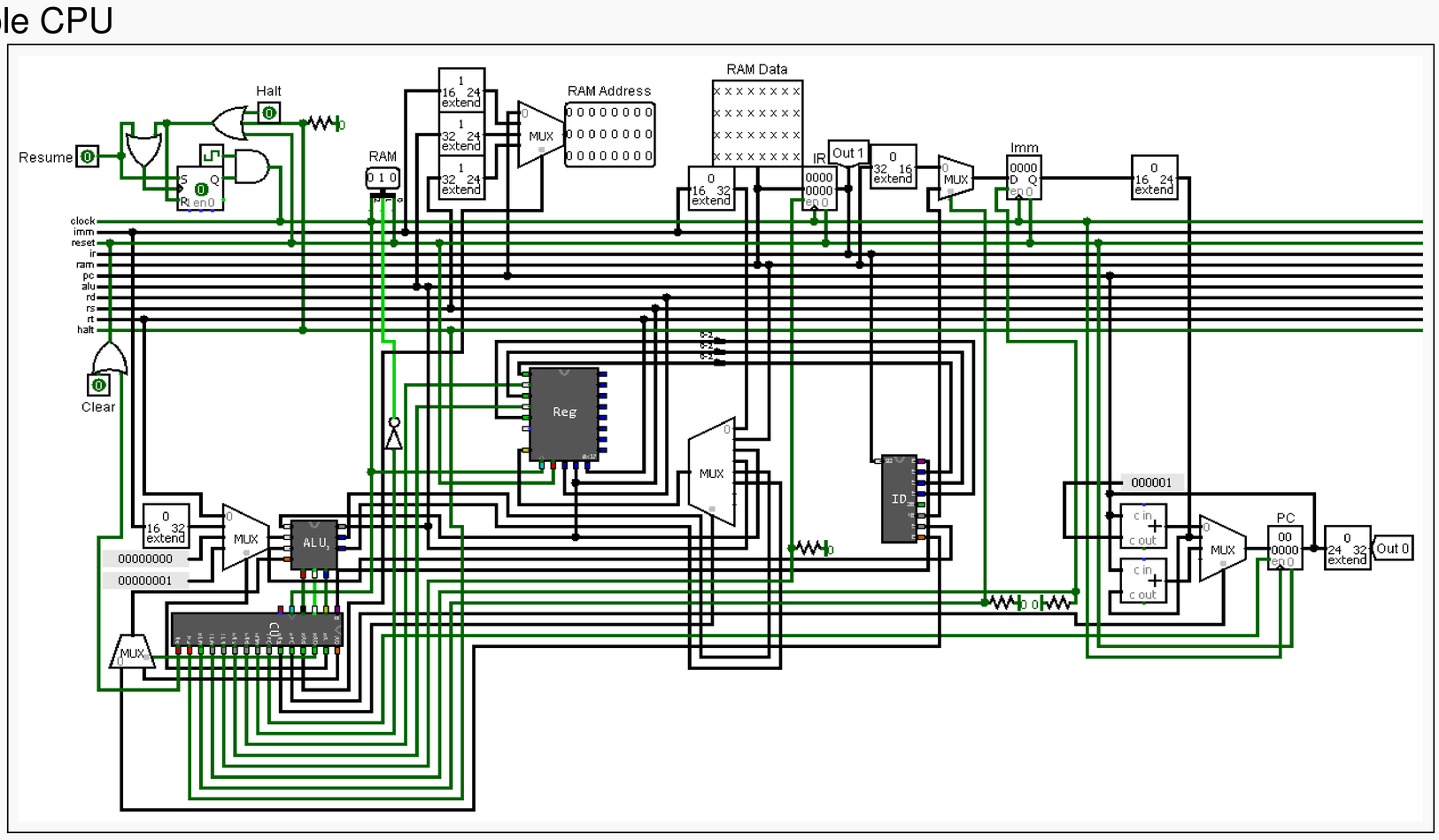
Need: It's too hard for beginners to learn about CPU design
Goal: Make it easier for beginners to learn about CPU design
Design Objectives: Produce a complete CPU design that includes seven lessons and practice exercises at the end of every lesson
Target Audience: Educational institutions that want to use a simplified CPU to teach a class and self-learners
Learning Modules: The completion time of the entire lesson plan is 3.6 hours



Completion Time for Each Learning Module

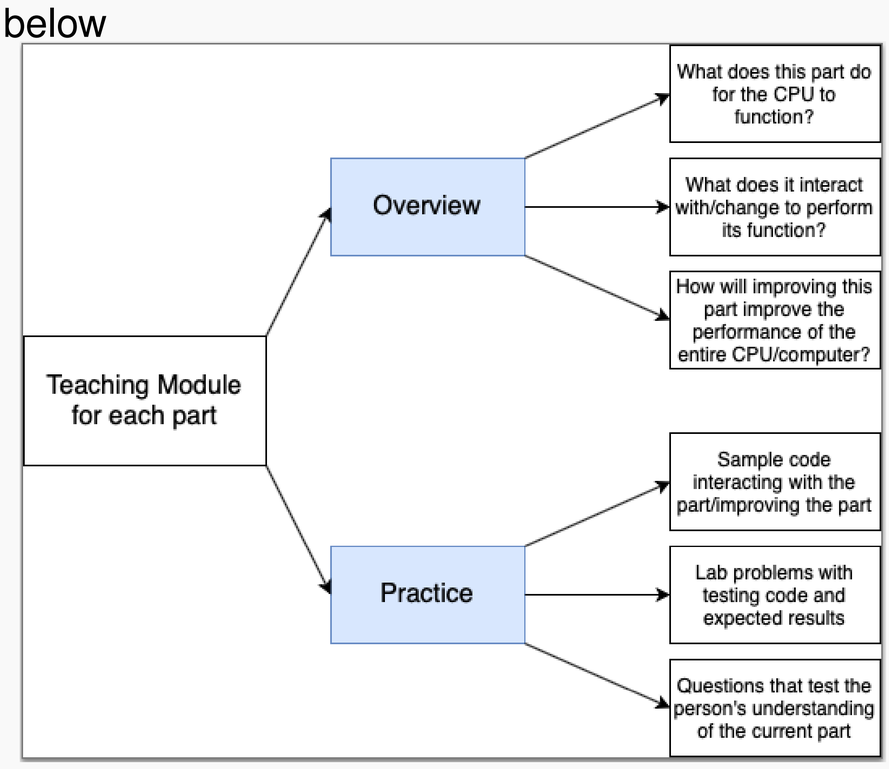
CPU Design

Prototype of our simple CPU



Teaching Strategy

The types of questions each learning module aims to answer is shown below



Assembly Code

Each line represents the machine code to the corresponding assembly code from a virtual machine

```
0x 00f01001000031 08   :: &main
0x 01f00000000000 02   <halt>
0x 01200100000000 06   [ $rt
0x 01200c00000000 06   [ $fp
0x 01209c00000000 06   [ $t0
0x 01200a00000000 06   [ $t1
0x 01200a40000000 06   [ $t2
0x 01200a80000000 06   [ $t3
0x 00204001800000 04   $sp -> $fp
0x 01e001660000000 8   $sp % 8 -> $m0
0x 001cc081000000 01   $sp -= $m0
0x 00204013800000 04   $sp -> $t0
0x 00400102000000 08   $sp -= 8
0x 01205d3800000 02    $a0 -> [$t0]
0x 01209d4000000 01    [$t0] -> $t1
0x 00250014800000 04   $t1 -> $t2
0x 00301 4affffffe8    $t2 + 4294967272 -> $t3
0x 00206001000000 04   $fp -> $sp
0x 00254003800000 04   $t3 -> $r0
```

Admin

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Github:
https://github.com/heimskr/educpu, https://github.com/heimskr/why.js