**✅ ABSOLUTE PRE-REQUISITES to Start a 16-Bit CPU Project**

These are the **core concepts you must already understand** before you even begin:

**🧠 1. Binary Number System**

| **You should be able to:** |
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| Convert between decimal and binary |
| Add/subtract binary numbers manually |
| Understand bit widths (4-bit, 8-bit, 16-bit) |
| Understand overflow and carry bits |

**🧠 2. Two's Complement**

| **You should be able to:** |
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| Represent negative numbers in binary |
| Add/subtract signed numbers using two’s complement |
| Understand why ~A + 1 gives -A in binary |

**🧠 3. Logic Gates & Truth Tables**

| **You must understand:** |
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| AND, OR, NOT, XOR |
| How to build a truth table |
| How to combine gates to form circuits |
| Concept of 1-bit and multi-bit signals |

**🧠 4. Basic Combinational Circuits**

| **You must know:** |
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| Half Adder, Full Adder |
| Multiplexers (MUX), Demultiplexers (DEMUX) |
| Comparators |
| Encoders/Decoders (basic understanding) |

**🧠 5. Basic Sequential Logic**

| **You should know:** |
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| What is a **clock pulse** |
| How a **D Flip-Flop** works |
| What is a **register** |
| How memory “remembers” bits using flip-flops |

**🧠 6. Logisim Evolution Basics**

| **Before you start, you must know how to:** |
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| Place logic gates and wires |
| Use buses and splitters |
| Make subcircuits and reuse them |
| Add clocks and simulate |
| Label pins, outputs, and modules |