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ARM Cortex-A Processor Family

Overview

This processor family is quite large and spans across many devices. Devices that contain these processors include the iPhone, Raspberry Pi and other cluster based computers. The benefits of the ARM architecture is the ability to conserve on power draw as the are smaller. Because the design of an ARM processor is SOC (system on a chip), it will require less energy to access essential computing resources. Also, the overall structure is meant to be simple and less intracet than Intel based CPUs, thus aiding to it's power saving abilities.

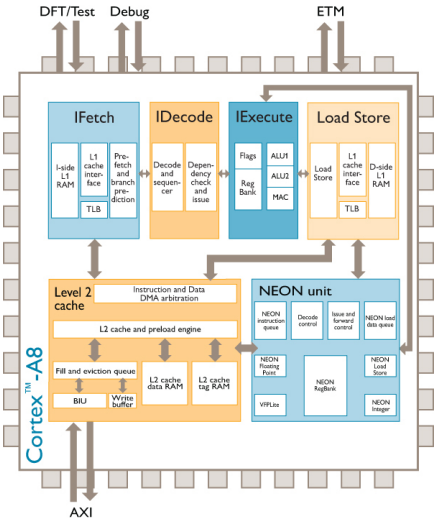

Figure 1: ARM Architecture Overview

In particular, we will be focusing on the AArch64 architecture cade of this family but we can still access lower portions of the architecture in a few different ways.

Registers

ARMv8 Register Count: 31

x86_64 Register Count: 16

ARM has more general purpose registers because most of the work is meant to be done with these registers, which helps with the overall performance of the chips. By defintion, the embedded registers are closer to the CPU, meaning there is less latency when instructions are fetched. Also, there is is a different naming scheme for the registers where in ARM, they are simply X0-X30 whereas x86-64 has only r8-r15 which slightly fit this.

Much like x86-64, some registers are hard coded to do specific tasks. Registers X0 - X18 are considered "disposable" registers where the information has the option to be corrupt as they do not store system critcal information

Lower Registers

Accessing the lower 32 bit register looks like this:

```
ADD W0, W1, W2
```

Where in x86_64 it looks like this:

```
add r9w, r8w
```

Notice that there are three operands in the first example ## Bussess

Multiprocessing

Virtualization