Lab06-WiD Draft

A processor cache can be explained using a metaphor of a student going to study abroad. Depending on the location of the program they are attending and its distance to home, they will prepare what to take with them. In this case we will only be focusing on the clothes. The main memory is then the collection of all of their clothes that is in their closet at home. This has all the clothes including winter, summer etc. So, the main memory (closet containing all clothes) would be a long way to travel and inefficient. For this reason, the cache would the clothes they chose from their collection to bring to their study abroad program. This includes a little bit of everything to accommodate the seasons. These clothes would be easier to get a hold of however the student does not need access to all of these clothes at once. So the registers would be the clothes they have easy access to. The registers would be the clothes dedicated to each separate season. Things for the winter that would be essential to the student would be a winter coat, gloves etc. This is where the ALU comes in. The ALU would contain the clothes they use every day and need to have nearby.

As it happens it will be likely that the student forgot to pack everything they need to study abroad since they can't bring everything because of limited space. So, when the student checks the clothes that they have brought (cache) and cannot find it is what is called a cache miss. This is very annoying and time consuming. Now, the student has to wait until they go back home for break to get the article of clothing. Then they will have to go through the collection of all of their clothes to find it. A cache hit is the opposite of the cache miss. This is when the student checks to see if they brought an article of clothing and are able to find it in their closet at the study-abroad program.

To understand spatial locality with this metaphor, we can take into account the winter season. If it is snowing and cold, the student is going to need gloves. But, this will not be enough to keep them warm so with that they will need a beanie, heavy duty coat, hand warmers etc. So, when the next time it snows, the student is likely going to be needing the same things. When they use something like a hand warmer, we know they will also need the other things. With this example temporal locality can also be explained. When it is snowing, the student needs their gloves. Whenever it snows, we know that it isn't going to melt immediately and start warming up. This is why they will be needing their gloves again when they leave their room.