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1. Function of the program counter register:

A program counter is a register in a computer processor that contains the address (location) of the instruction being executed at the current time. As each instruction gets fetched, the program counter increases its stored value by 1. Program counter(PC) , is also called instruction pointer. It is a digital counter needed for faster execution of tasks as well as for tracking the current execution point.

1. Register in C example:

unsigned int array[25];  
int main(){  
 register int x;  
 unsigned int p = 1;  
 unsigned int q = 2;  
 unsigned int r;  
 for(x=0;x<25;x++){  
 r = p - q;  
 p = q;  
 q = r;  
 }   
}

1. MIPS memory map in C example:

int p, q, r;  
  
int subtractValued(int x, int y) {  
 return (x - y);  
}  
  
int main(void){  
 p = 10;  
 q = 2;  
 r = subtractValues(p, q);  
 return r;  
}

1. LW R1,10(R2) “load word”

This means: R1←Mem [R2+10] or in other words “Memory to register”

|  |  |  |  |
| --- | --- | --- | --- |
| **op** | **rs** | **rt** | **immediate** |
| 35 | 2 | 1 | 10 |
| 100011 | 00010 | 00001 | 1010 |

A close up of a map

Description automatically generated

1. J EXIT “jump to address = EXIT”

This means: to jump down, ignore anything below it, and just exit the program

|  |  |
| --- | --- |
| **op** | **address** |
| 2 | 10 == exit |
| 000010 | 1010 |