VLSI Design Flow: RTL To GDS (NPTEL Course)

Lab Tutorial 3

Objective: To gain a hands-on experience on High Level Synthesis

Requirement:

- You can use any tool for HLS
- Following open-source HLS tool can also be used: **Bambu HLS**

Installation of Bambu HLS:

1. Update package index files on system

$ sudo apt-get update

2. Install dependencies required by Bambu HLS tool

$ sudo apt-get install -y --no-install-recommends build-essential ca-certificates gcc-multilib git iverilog verilator wget

3. Downlaod AppImage

$ wget https://release.bambuhls.eu/appimage/bambu-0.9.7.AppImage

4. Make AppImage executable

$ chmod +x bambu-0.9.7.AppImage

5. AppImages require Linux technology called “File system in userspace” (FUSE). Installing FUSE

$ sudo add-apt-repository universe

$ sudo apt install libfuse2

6. Run tool

$ ./bambu-0.9.7.AppImage <path-to-c-file> --top-fname=<accelerator-function-to-be-implemented-in-hardware>

Example: Input C code for generating Verilog RTL using HLS tool:

```
long func(int,int,int,int);
main()
{
        int j;
        int k;

        int c;
        int d;

        int res = func(j,k, c, d);
        return 0;
}

long func(int j,int k, int c, int d)
{
        int i=0;
        if(c > 2){
                i = j - k;
        } else if (d < 5) {
                i = j + k;
        } else {
                i= 12;
        }
return i;
}
```

For more information:

C. Pilato and F. Ferrandi, “Bambu: A modular framework for the high level synthesis of memory- intensive applications," in ***23rd International Conference on Field programmable Logic and Applications***, pp. 1-4,IEEE, 2013.

Where and how to download? https://panda.dei.polimi.it/?page_id=81

NOTE: downloading and running the AppImage is sufficient

How to run?

Tutorial: https://panda.dei.polimi.it/?page_id=555

script: ./bambu-x86_64.AppImage file.c <path of c file> --top-fname = <accelerator func>

How to get more information?

Reference paper:

https://www.researchgate.net/publication/315383441_Open_Source_HLS_Tools_A_stepping_stone_for_modern_Electronic_CAD

https://www.researchgate.net/publication/261299590_Bambu_A_modular_framework_for_the%20_high_level_synthesis_of_memory-intensive_applications

Github:

https://github.com/ferrandi/PandA-bambu