Another way of looking at the bright side of dark silicon
Extrapolation of the above design can be leveraged to achieve higher performance by future work can involve the analysis of the misprediction rate threshold considered here.
The Bumble-bee transformer always try to best cache replacement policy is dependent on the type of the application being run.
We implemented our system using Macsim simulator.

The Advent of Dark Silicon

Infinite parallelism?? Infinite Power ??: No both are limited creating dark silicon[1]
What do we have?? - lots of hardware which is not powered on
What can we do?? - different types of micro-architecture on the same silicon
What are we trying?? - hardware which adapts to the application running by changing its micro-architecture dynamically
The rise of Transformers

Transformers

Different applications show more affinity to some micro-architectures than others
The transformer is a mechanism of managing multiple micro-architectures in a given stage
Not all the micro-architectures are kept running
Transformer turns on the required micro-architecture for the application phase
Bumblebee is a Branch-prediction Transformer and Optimus-Prime is a Cache Replacement policy transformer.
Bumblee-Bee - three different branch predictors, gshare, gskewed & bimode
Optimus-Prime - transforms between LRU and DRRIP[2]

Experimental Results

We implemented our system using Macsim simulator [6]
The simulator is modeled on Intel Sandy Bridge type architecture
We used SPEC2006 workloads

The Bumble-bee transformer always try to achieve the performance of the best individual predictor as shown in Figure 1
The misprediction rate threshold considered here is 25%
The analysis of the number of times the branch predictor switch happens for different values of threshold is as shown in 2

Experimental Results -II

The Optimus-Prime Cache Replacement Transformer was used for L3 cache replacement
It gets best of both LRU(Least Recently Used) and DRRIP[2] replacement policy; it is shown in figure 3

References