ECE7995
Caching and Prefetching Techniques in Computer Systems

In-class questions for Presentation:

TPF: a System Thrashing Protection Facility
• The following graph illustrates how CPU utilization changes with the increase of degree of multiprogramming.

Could you explain why CPU utilization tends to increase with the increase of number of concurrent processes in system until thrashing appears?

• What are the advantages of the global page replacement polices, compared with the local page replacement polices? However, it can lead to page thrashing. Why?

• Could you figure out that why the term “NRU” rather than “LRU” is used when talking about searching for victim pages in the paper?
In the evolution of the replacement policies in the several Linux versions (2.0, 2.2, and 2.4), there is conflicting interests of between the requirements on CPU utilization and memory utilization in a multiprogramming environment. Answer these questions:

1) What do the CPU utilization and memory utilization refer to, respectively?

2) In the context of replacement policies, what the system should do for high CPU utilization? and for memory utilization? Then explain why the conflicting interests?

What are signs of an emerging thrashing, so that TPF should kick in?

What actions do TPF take to eliminate/alleviate thrashing (or to remove those signs)?

What is the criterion for TPF to select a process for receiving privileged protection? When is the protection taken off from the process?

Why does the protection need to be taken off once a process establishes its working set? If the process that has established its working set is CPU-intensive, do you think that another process could receive the protection before that process completes its execution?