Dynamics of priority-queue networks BYUNGJOON MIN, KWANG-IL GOH, IN-MOOK KIM, Korea University — Recent application of priority queue models for human dynamics opened a way to study the human behavior under quantitative framework. Given the evident active engagement in social networking of individuals, dynamics of priority queues forming networks needs to be understood. Along this line, here we study the dynamics of priority-queue networks by generalizing the binary interacting priority queue model of Oliveira and Vazquez (OV). We found that the OV model with AND-type protocol for interacting tasks is in general not scalable for the queue networks with more than two queues, because the dynamics for interacting tasks become quickly frozen due to the priority conflicts. We then consider a scalable interaction protocol, an OR-type one, and examine the effects of the number of queues and the network topology on the waiting time dynamics of the priority-queue networks, finding that its distribution exhibits power-law tail in all cases considered, yet with exponents dependent on the network topology. We also show that when the tasks in the queue network are executed synchronously, priority conflicts affect the waiting time dynamics strongly, resulting in a different power law.

Kwang-Il Goh
Korea University

Date submitted: 21 Nov 2008   Electronic form version 1.4