IEOR 8100: Topics in OR: Asymptotic Methods in Queueing Theory

Fall 2009, Professor Whitt

Class Lecture Notes: Monday, September 28.

many-server heavy-traffic limits

Topics Covered

1. The three regimes: (i) the underloaded or quality driven (QD) regime, (ii) the critically loaded, "Halfin-Whitt" or quality-and-efficiency-driven (QED) regime, (iii) the overloaded or efficiency-driven (ED) regime. The Markov case: $M/M/s+M$ and $G/M/s+M$.

References

i. S. Halfin, W. Whitt. Heavy-Traffic Limits for Queues with Many Exponential Servers. *Operations Research*, vol. 29, No. 3, May-June 1981, pp. 567–588.

ii. O. Garnett, A. Mandelbaum, M. Reiman. Designing a Call Center with Impatient Customers. *Manufacturing and Service Operations Management*, vol. 4, 2002, pp. 208–227.

iii. G. Pang, R. Talreja, W. Whitt. Martingale Proofs of Many-Server Heavy-Traffic Limits for Markovian Queues. *Probability Surveys*, vol. 4, 2007, pp. 193-267.

2. Deterministic Fluid Approximations for the $G_t/GI/s_t+GI$ Model

References

i. W. Whitt. Fluid Models for Multiserver Queues with Abandonments. *Operations Research*, vol. 54, No. 1, 2006, pp. 37–54.

ii. Y. Liu, W. Whitt. A Fluid Model for the $G_t/M/s_t+GI$ Many-Server Queue with Time-Varying Arrivals. in preparation.

3. FWLLN's and FCLT's for many-server queue with non-exponential distributions

References

i. G. Pang, W. Whitt. Two-Parameter Heavy-Traffic Limits for Infinite-Server Queues. Submitted to *Queueing Systems*.

ii. J. Reed, R. Talreja. Distribution-Valued Heavy Traffic Limits for the $G/GI/\infty$ Queue. Available at: http://www.columbia.edu/∼rt2146.