

The background of the slide features a large, semi-transparent watermark of the NPTEL logo. The logo is circular, with a stylized flower or star-like pattern in the center. The outer ring of the logo contains the text 'NPTEL' in a circular arrangement. The watermark is rendered in a light blue/grey color, allowing the text to be legible over it.

NPTEL MOOC, JAN-FEB 2015
Week 1, Module 3

DESIGN AND ANALYSIS OF ALGORITHMS

MADHAVAN MUKUND, CHENNAI MATHEMATICAL INSTITUTE
<http://www.cmi.ac.in/~madhavan>

Example 2: Xerox Shop

- * Campus Xerox has several photocopiers
- * Tomorrow is the deadline for BTech projects and there is a rush of reports to be printed
- * How to schedule the pending jobs most effectively?

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Xerox Shop ...

- * The number of pages for each job is known
- * Each customer has been promised delivery by a deadline
- * Campus Xerox offers discount if deadline is not met
- * How to sequentially allocate the jobs to photocopiers to maximize revenue?

Xerox Shop ...

- * Brute force
 - * Try all possible allocations
 - * Choose one that is optimum
- * Number of possibilities is exponential!
- * Even with 30 jobs, it would take hours to compute an optimal schedule

Xerox Shop ...

- * Decompose the problem
- * Choose a job to schedule first, and the machine on which it will run, according to some strategy
- * Now, recursively solve the problem for $N-1$ jobs

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Xerox Shop ...

- * **Greedy approach**

- * Fix the choice of next job once and for all
 - * Never go back and try another sequence
- * How to choose the next job?
 - * Shortest processing time?
 - * Earliest deadline?
- * How to show that this strategy is optimal?

Variations

- * Some photocopiers are old and slow, some are new and fast
- * Time for a job depends on choice of machine
- * Cost of ink and paper varies across machines
- * Net revenue for a job depends on choice of machine

Variations

- * Account for set up time between jobs
 - * Need to reserve time slots to reload paper
- * Is there a valid greedy strategy?

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