



# UPS Air Freight Traffic Simulation for Pacific Gateway Cargo Center

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# Company Background

- LA/Ont international Airport is the center of a rapidly developing freight movement system.
- A former Lockheed aircraft hangar at Ont was recently converted into a new facility for air cargo operations, called “Pacific Gateway Cargo Center”



# Problem Statement

- ONT's cargo operations were conducted in the airport's Chaffey Hangar, which is no longer adequate for ONT's increasing cargo operations.
- In 2007, ONT handled 532,865 tons of cargo.



# Why UPS?

- United Parcel Service (UPS) is ONT's largest airfreight carrier, handling more than 70 percent of the airport's cargo. ONT is the west coast hub for all **UPS** air freight operations
- The remaining 30% of the airport cargo consist of Ameriflight, Arrow Air, Centurian Airlines, DHL (Airborne Express), Empire Airways, Evergreen Aviation, ExpressNet Airlines, Federal Express, Gulf and Caribbean Cargo, IFL Group, & Kalitta Air.



# Project Objectives

- To monitor the processing time of loading and unloading packages.
- To minimize the total labor cost of the system by reducing the idle time of workers
- To maximize the utilization of resources



# Assumptions

- 75 planes are scheduled to arrive in 12 hrs in one day<sup>1</sup>
- Wages for workers are \$13.57 per hour busy/idle<sup>2</sup> -
- Schedule planes arrive every 30 minutes from 8AM-8PM
- Unscheduled planes arrive with a Poisson distribution with a mean of 3 hours.

<sup>1</sup><http://www.aviationsalary.com/hourly-aviation-pay.asp>

<sup>2</sup>An aircraft Taxi simulation model for UPS Louisville Air Park



# Assumptions Contd.

- Sample of containers - discrete probability.
- Maximum containers = 15 containers.
- Parking spot (dock) = 12 spaces.
- 5 minutes for both landing and take off
- Unloading rate - NORM(3 min, 1 min),  
5 workers
- Loading rate – NORM(5 min, 1 min),  
5 workers
- Waiting time for loading containers = 10 min



# Input Parameters

- UPS freight schedule / non-schedule flight
- Number of parking space (dock)
- Discrete probability of containers
- Loading rate/ Unloading rate
- Waiting time for loading containers
- Number of loading workers
- Number of unloading workers

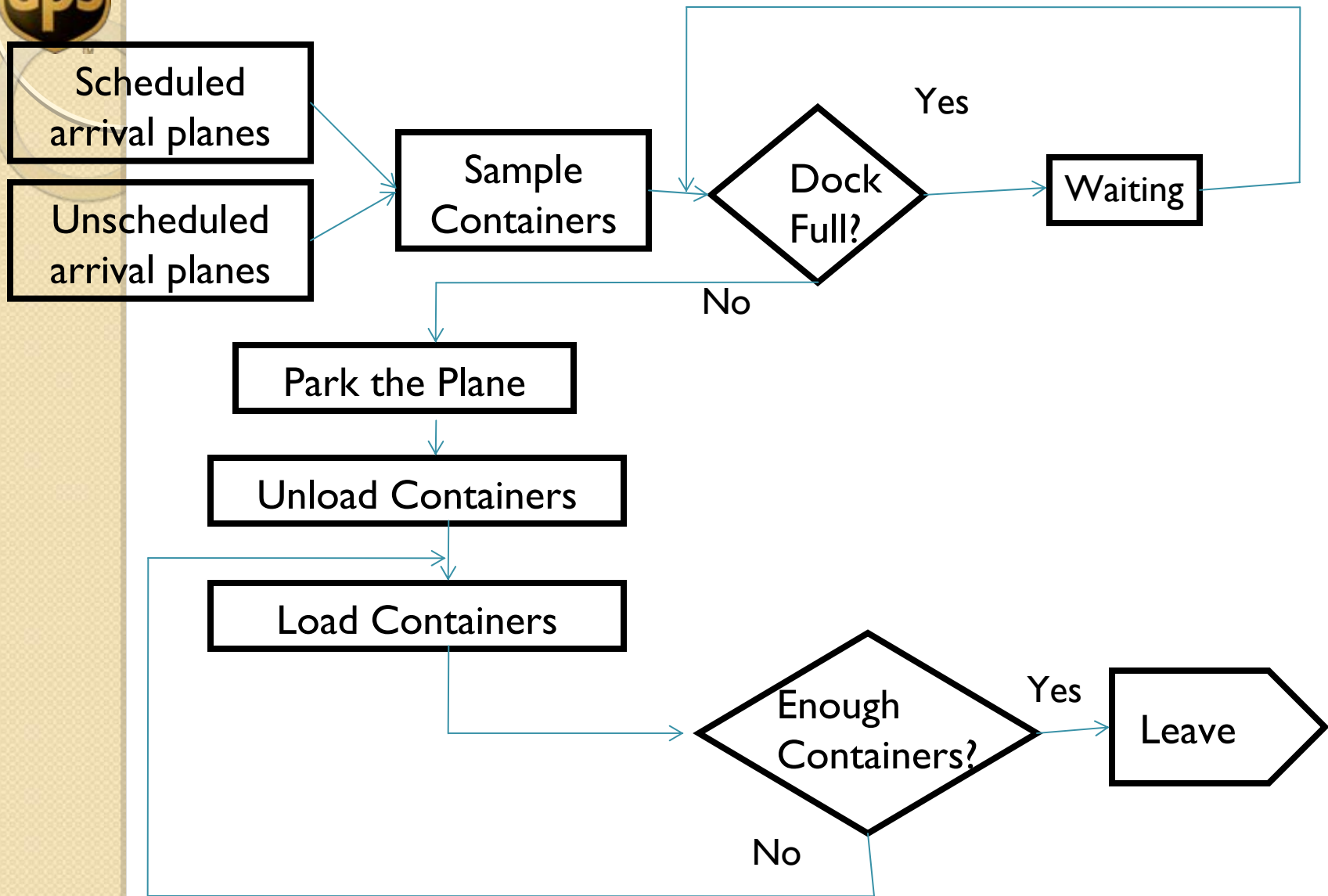


# Output parameters

- Total labor cost
- Utilization of each resources
- Number of plane departing from the airport

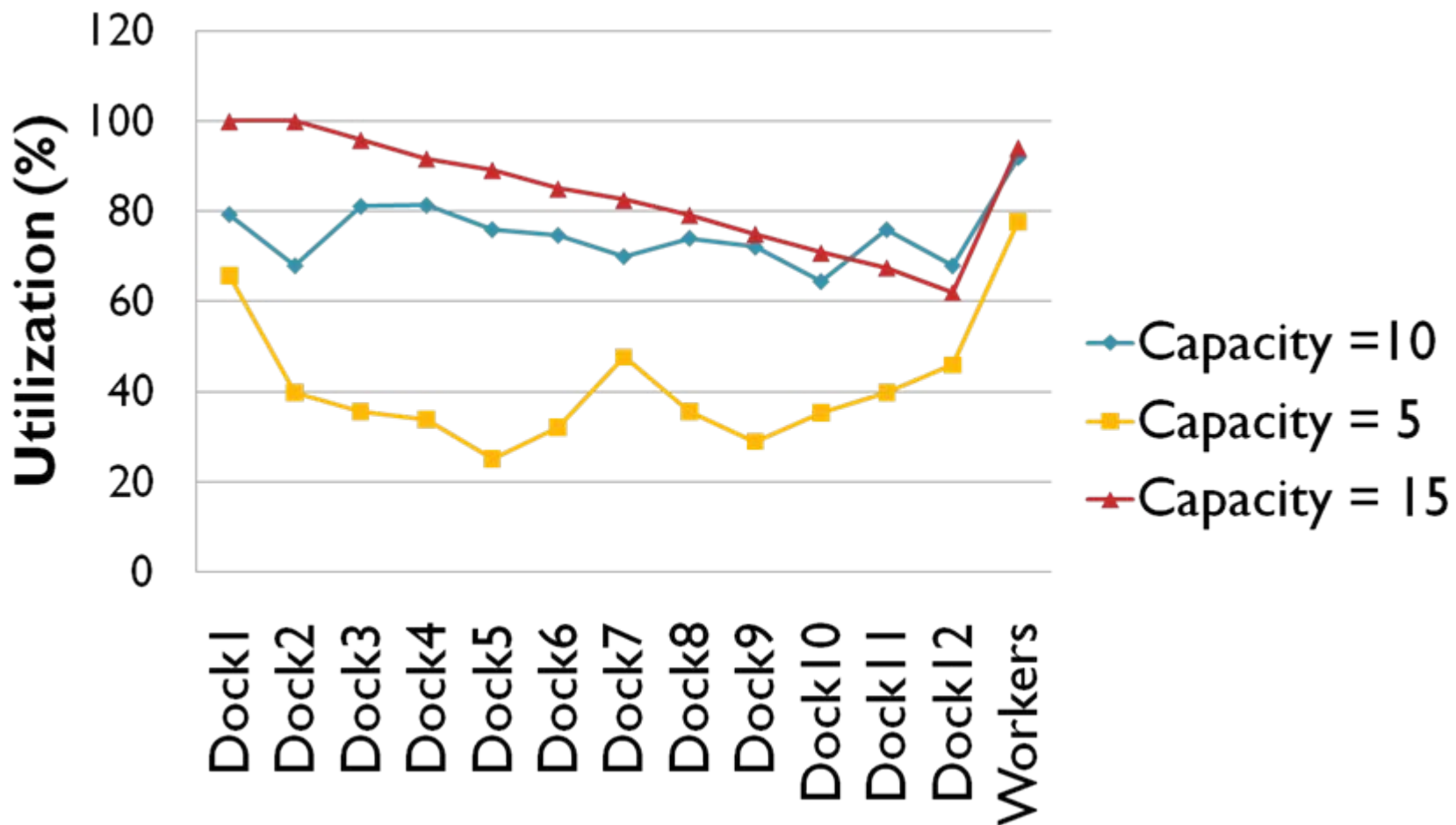


# Flow chart



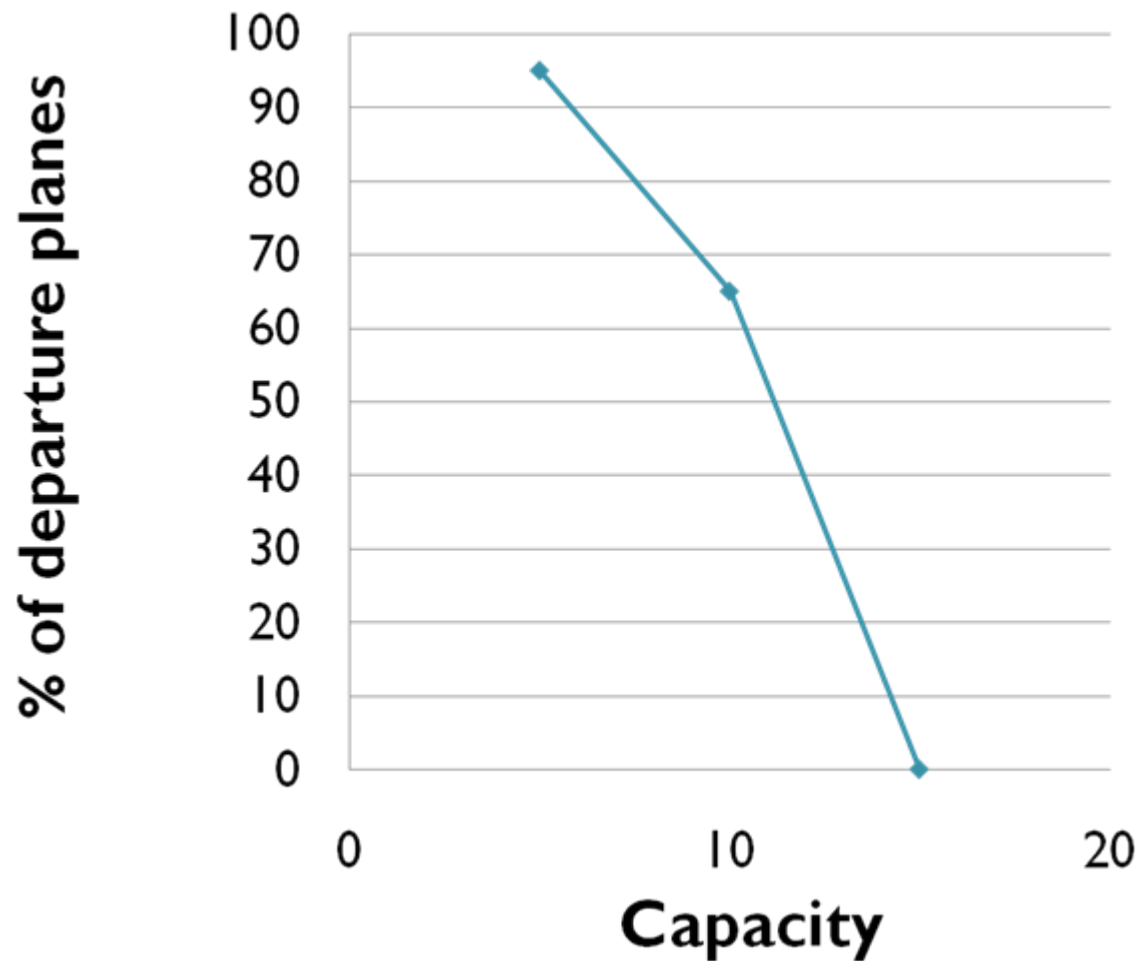


# Utilization Rate





# % of Departure Planes





# Questions

- Replication length: 12hrs (8:00 am ~8pm)
- Minimum capacity: 10 containers
- Q1: Mean waiting time for arriving airplanes, Loading and Unloading
- Q2: The utilization of workers.
- Q3: Total Labor Cost per day.



# Answers

Loading time: 0.172 hr, 10 min

Unloading time: 0.1209 hr., 7 min

Arriving airplanes: 0.4203 hr, 25 min

Utilization of workers: 92.78%

Total labor cost: \$1,623/day



# Conclusions

- Optimum Capacity : at least 10 Containers
- Utilization rate of
  - Workers: 90%
  - Docks: 70% – 80%
- % of departure planes: 60% -70% of total incoming planes
- Total labor cost: \$1,623/day



# Questions

Thank you