中山大學
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# Project

## Algorithm Design

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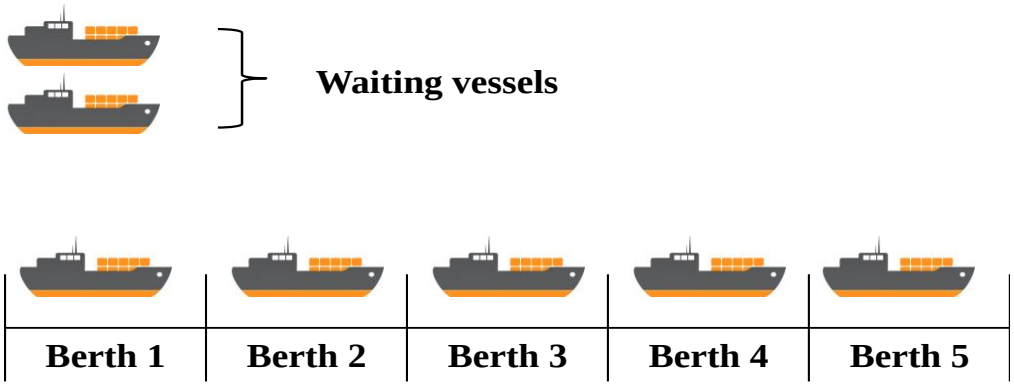
# Berth Allocation Problem

- In a container terminal, such as the Hong Kong Container Terminal, the bottleneck of the traffic is often at the quay. Therefore, the terminal operator has to allocate a limited number of berths of the quay to vessels in an efficient way.



# Berth Allocation Problem

- Consider a container terminal of $n$ berths and $m$ vessels arrived, where each vessel requires one or more berths to load and unload containers. Vessel $i$ (for $i$=1,2,…,$m$) arrives at time $a_i$ with its service time $t_i$ hours, and it occupies $b_i$ berths.
- For each vessel $i$=1,2,…$m$, the terminal manager needs to decide on the berths, as well on the starting time $s_i$ of berthing for it.
- It must be satisfied that no two vessels are allowed to occupy the same berth simultaneously, i.e., for any two different vessels $i$ and $j$, if $b_i$=$b_j$, then either $s_i + t_i <= s_j$ or $s_j + t_j <= s_j$ must be satisfied.
- Given the limited time horizon, your task is to help the manager to minimize the unassigned vessels, the total waiting time and the last departure time of all the vessels.

# Game website: 172.18.57.223

# Your task

- Suppose that
  - Weight of unassigned vessels: w1=100
  - Weight of total waiting time: w2=2
  - Weight of last departure time: w3=1
- If your arrangement has
  - No. unassigned vessels: x1
  - Total waiting time: x2
  - Last departure time: x3
- Then f(x)=w1x1+ w2x2+w3x3
- You need to minimize f(x) subject to the aforementioned constraints.

# What to submit

- A zip/rar package (Deadline: 2017/6/4)
  - Your codes
  - project.xlsx

| | Unassigned vessels (x1) | Total waiting times (x2) | Last departure time (x3) | f(x)=w1x1+w2x2+w3x3 | Solution |
|---|---|---|---|---|---|
| Game 1 | *1* | *5* | *5* | *115* | *0, 0; 0, 3; 2, 3; 0, 4; -1, -1* |
| Game 2 | | | | | |
| Game 3 | | | | | |
| Game 4 | | | | | |
| Game 5 | | | | | |
| Game 6 | | | | | |
| Game 7 | | | | | |
| Game 8 | | | | | |
| Game 9 | | | | | |
| Game 10 | | | | | |
| Game 11 | | | | | |
| Game 12 | | | | | |

  - Your report
    - Algorithms
    - Experiments on (original and new) instances
    - Results

# Thank you!