

Waste Container Analysis

UMKC SCE SP17 Hack-A-Thon

Grand Finale - Apr 20th, 2017



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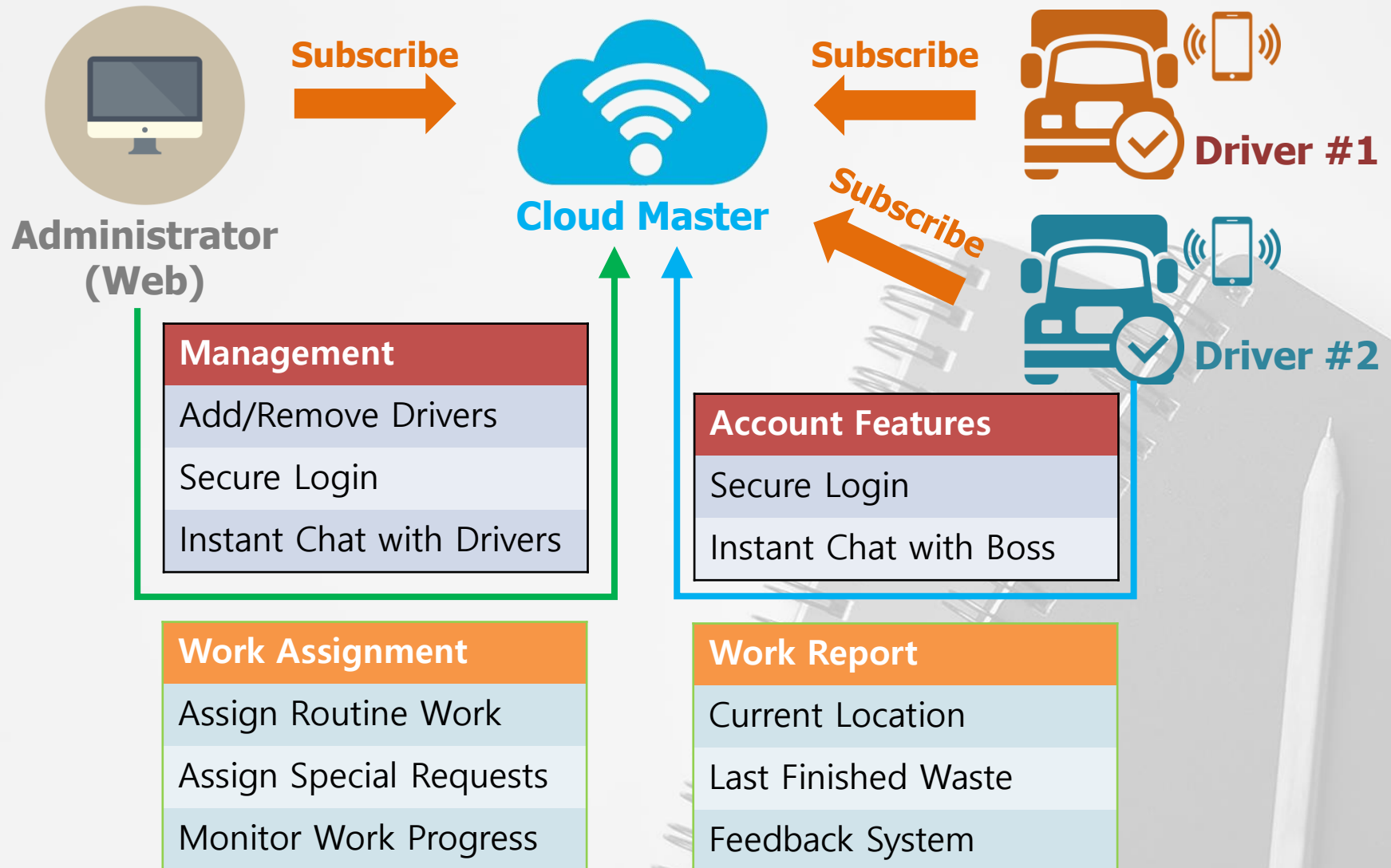
Chen Wang

Use Case Provided by

UMKC SCE

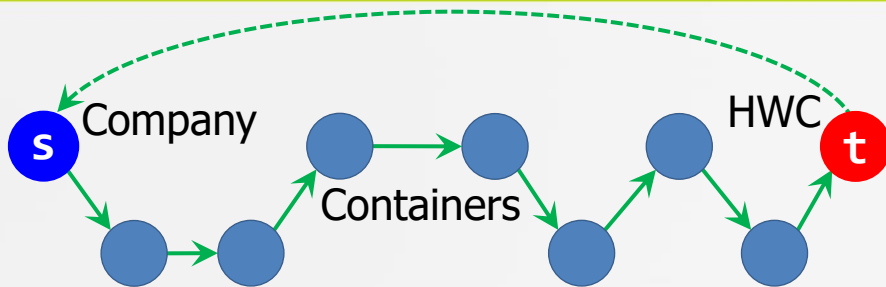
System Architecture - Web Master and Mobile Terminal

How truck driver (mobile) and supervisor (web) instantly exchange info?



Algorithm - Engine of "Sky Defender"

Research: how to determine an optimal schedule (shortest path)?



Equivalent Theoretical Model

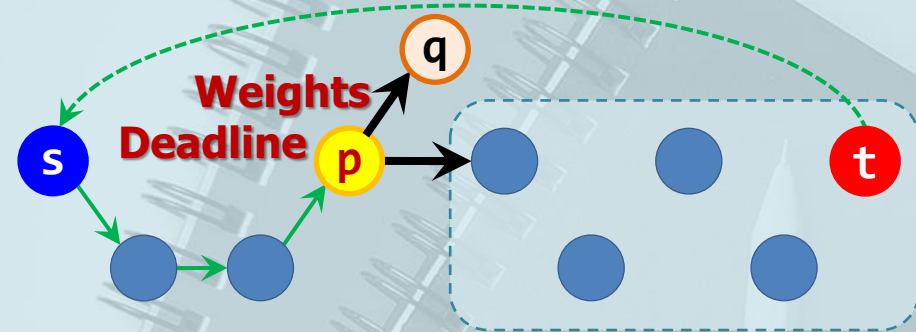
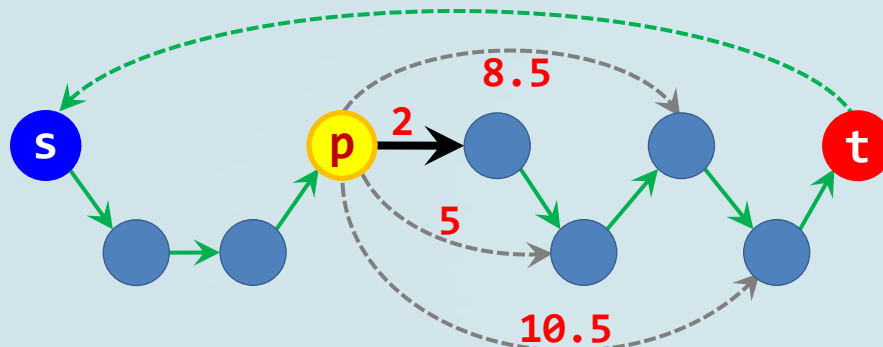
"In a complete graph, try to find a shortest Hamiltonian path from s to t."

This is an NP hard problem. We need to find approximation algorithm.

The Deadline-Guaranteed Nearest Neighbor Algorithm in Euclidean Space

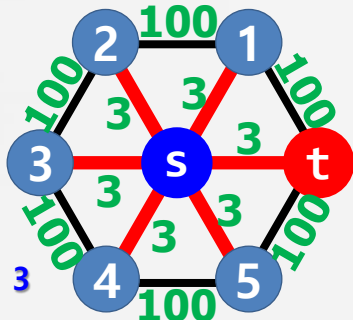
In each step, choose the nearest node to move.

Compare shortest edge with "new edge".

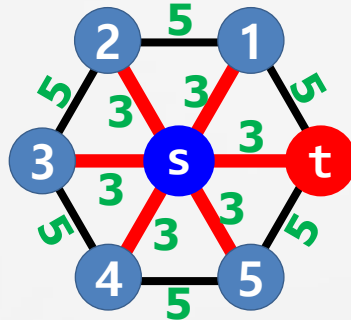


Determine "old way" after adding new node.

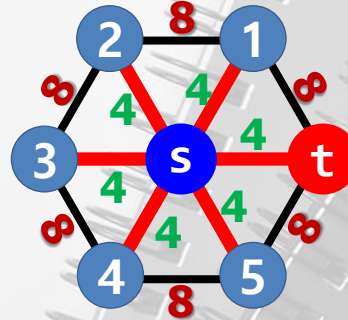
Non Euclidean



Euclidean



Extreme Case



$P \leq 2 \times \text{MST}$
 $\text{MST} \leq \text{Optimal}$

$\text{Optimal} \leq P \leq 2 \times \text{Optimal}$

Approximation = 2

Amazing Features - Multi-Platform Implementation

Features, Applied APIs, Frameworks, and Platforms



Seamless Instant Message Exchange

Chatting application between administrator and truck drivers built-in. They can exchange message instantly.

Google Map



Web Master	Android Terminal
Real-time track driver's location.	Show current location.
Show or hide the 120 trash boxes locations, which are categorized into 8 regions.	Show the next waste location he/she is going to with the route, including name, distance, and est. time.

