Freight Data Models @Uber

September 13, 2019

Jon Freer, Jennie Nguyen | Uber Freight

Agenda

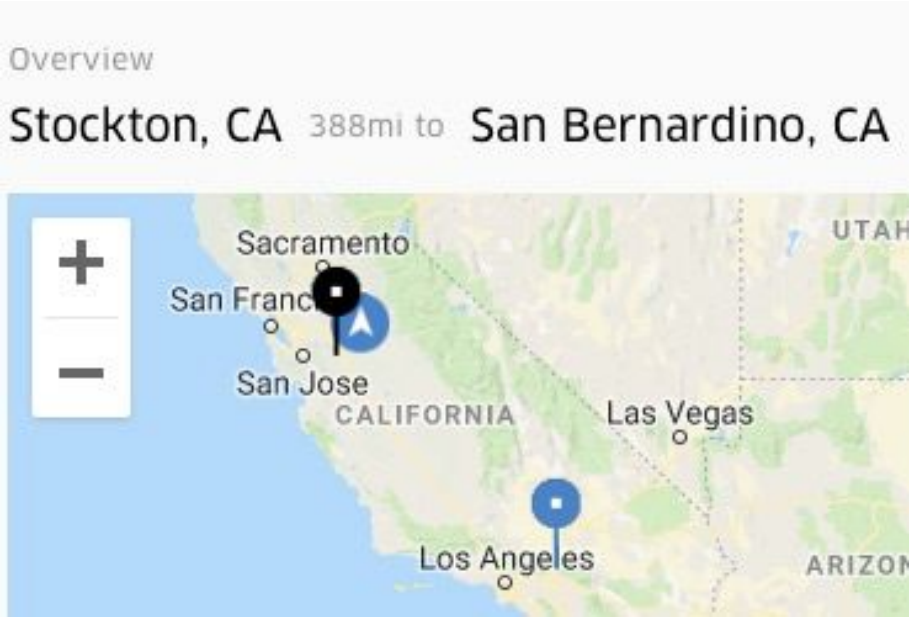
00 History of Freight Models
01 Next Generation Freight Data Model

History of Freight Models

Background

- In 2016, a few engineers built an MVP system that launched in 2017 that gave birth to Uber Freight.

Load

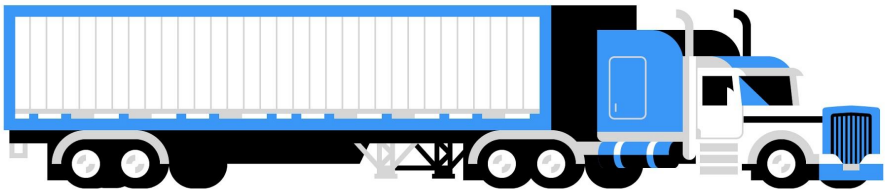


- Different from Uber Rides Business
    - Cost
    - Duration
    - Pricing

Customer

- B2B - Enterprises
- Referred as the “Shipper”

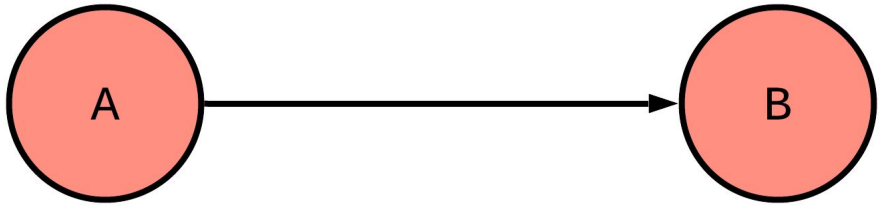
Carrier



- Trucking company Uber contracts with to move the load

Assumptions

- 1 Load = 1 Carrier
- 1 Load = 1 source and 1 destination



Early Data Model

```
struct Plan {
    1: optional PlanItem source
    2: optional PlanItem destination
}

struct Load {
    // Not used if this is a load to be created,
    1: optional string uuid

    // Not used if this is a load to be created, server gets it from
    // the http auth header.
    2: optional string shipperUUID

    3: required list<ManifestItem> manifest
    4: required Requirements requirements
    5: required Plan plan
}
```

Early Data Model

- Team grew, Definitions grew
- Today, there are 63 fields (versus initial 5)

Early Data Model

Limitations

- No distinction between shipment obligation and fulfillment strategy.
- No support for shipments with more than two stops.
- No support for common exception case scenarios.
- No support for future fulfillment use cases.
- It’s costing us money!
- ...more

Next Generation Freight Data Models

Load

Purchase Order

A collection of items. How these are organized is only of significance to the customer and shippers/receivers.

Item (Commodity)

A type of good being transported on the load.

Load

A truckload of goods to be moved.

Stop

A location where a series of tasks need to occur in order for the shipment to be successful.

Stop Task

An atomic interaction, such as picking up or dropping off a purchase order, that must be completed at a stop in order for the shipment to be considered successful.

Job

Job

A single atomic unit of fulfillment booked to carriers and drivers. A single job can accomplish an entire shipment, or just accomplish a portion.

Waypoint

A location where a series of tasks need to occur in order for the fulfillment strategy to be successful.

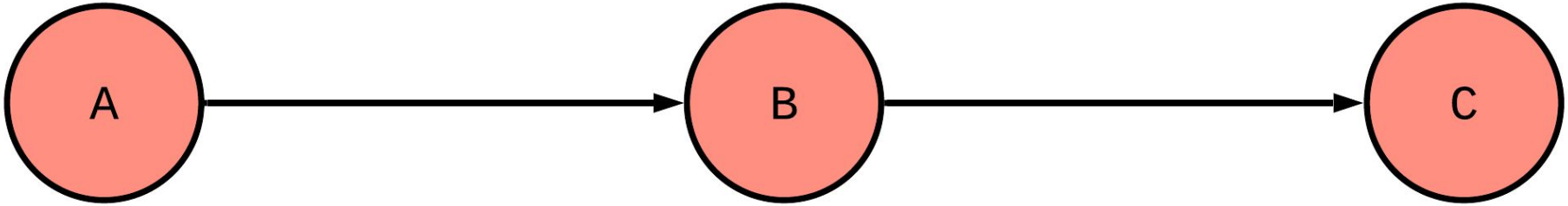
Waypoint Task

An atomic interaction, such as picking up or dropping off a purchase order, that must be completed at a waypoint in order for the fulfillment strategy to be considered successful.

Gains

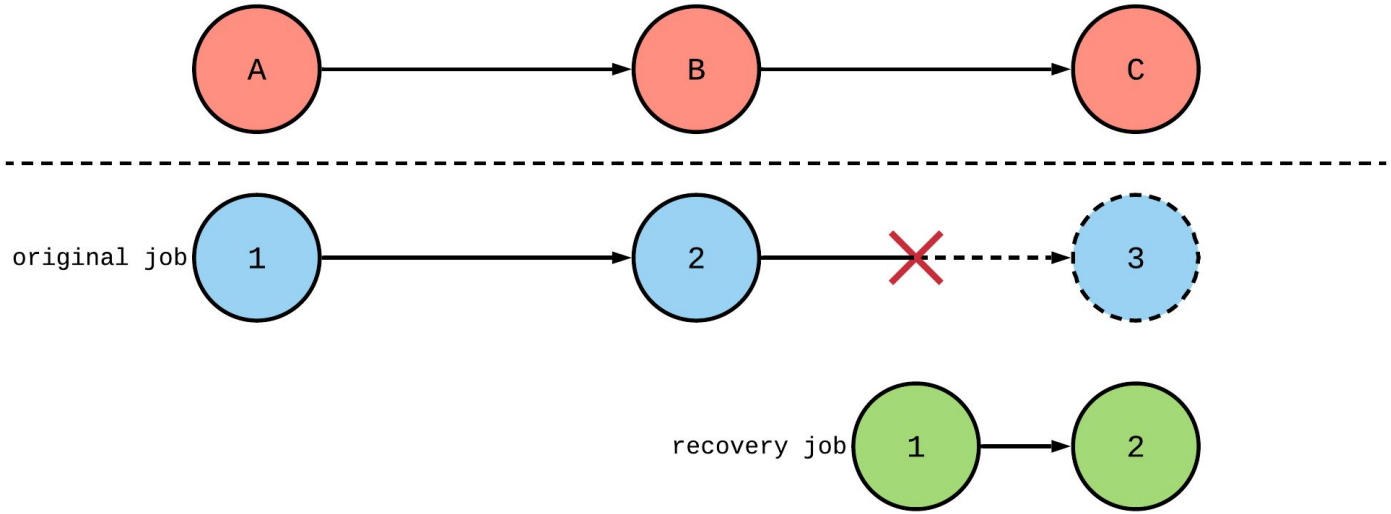
- Decoupling between shipment obligation (load) and fulfillment execution (job).
- Ability to accurately track and interact with purchase orders and their items.
- Each location of interest can indicate multiple pickup or dropoff operations.
- ...more

Fulfillment use cases



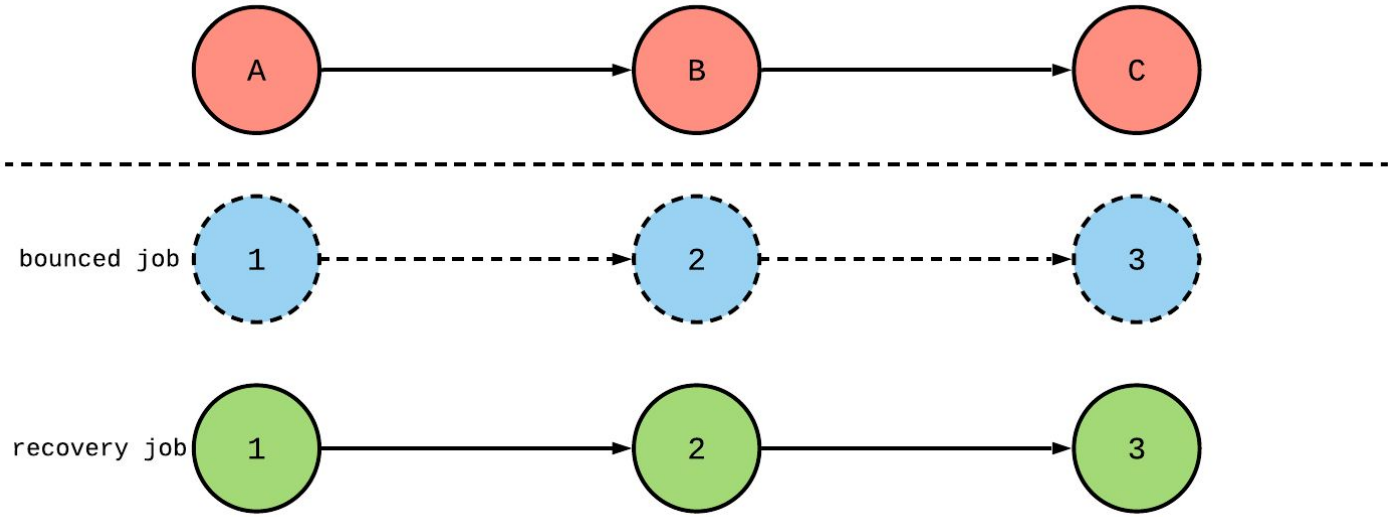
Multi-Stop

Shipments that involve interacting with commodities at more than two unique locations.



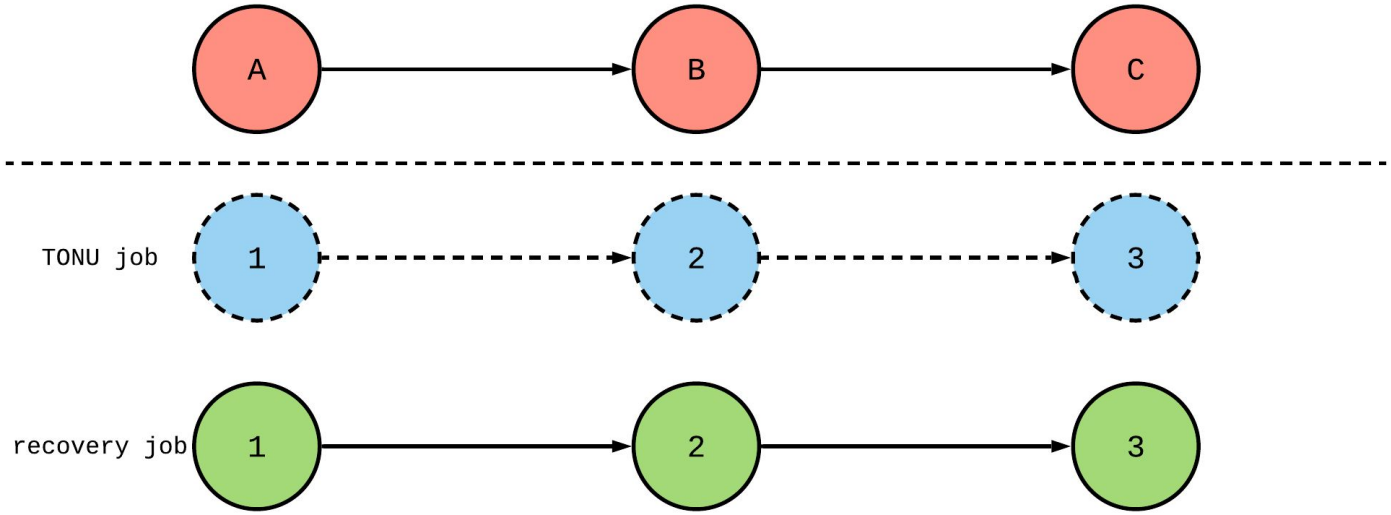
Breakdowns

When a driver's tractor encounters mechanical failure. Often times, the time to repair the vehicle exceeds a tolerable amount of time, requiring a transfer of the goods to another trailer for another carrier, or a trailer swap with the same carrier.



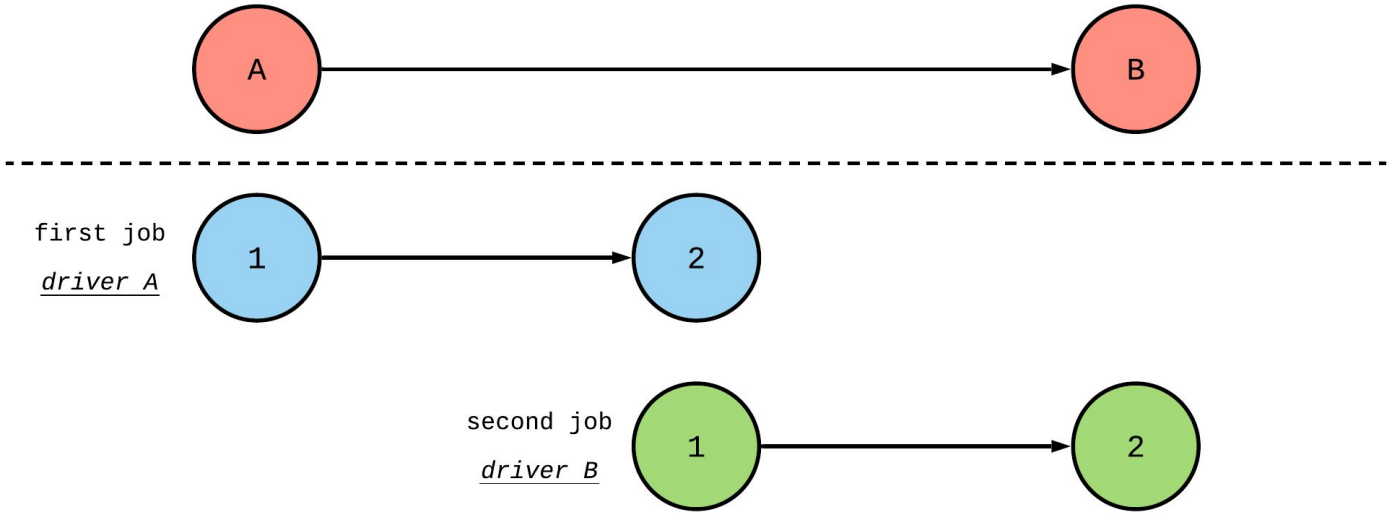
Bounces

Occurs when a carrier is no longer able to satisfy their commitment to fulfill the shipment. This could happen for a variety of reasons, including scheduling, exception case scenarios, market conditions, etc.



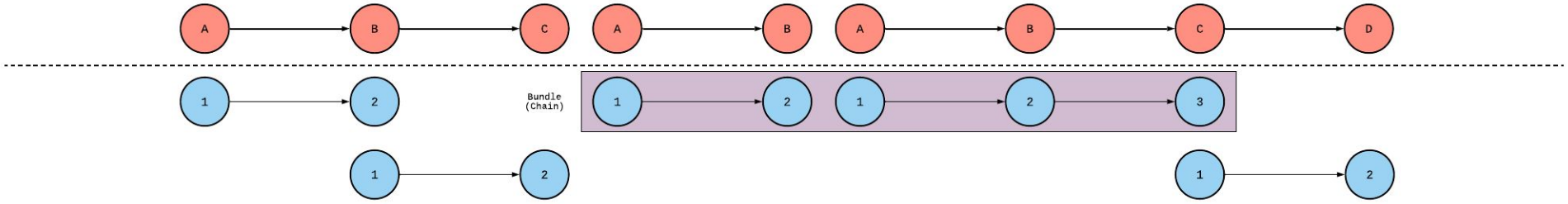
Truck Order Not Used (TONU)

Occurs when we believe a shipment is ready to be picked up, but when the driver arrives there is no shipment for them to pickup. In these cases, we often compensate the driver that made the unnecessary trip, and reschedule it for another carrier or driver to fulfill.



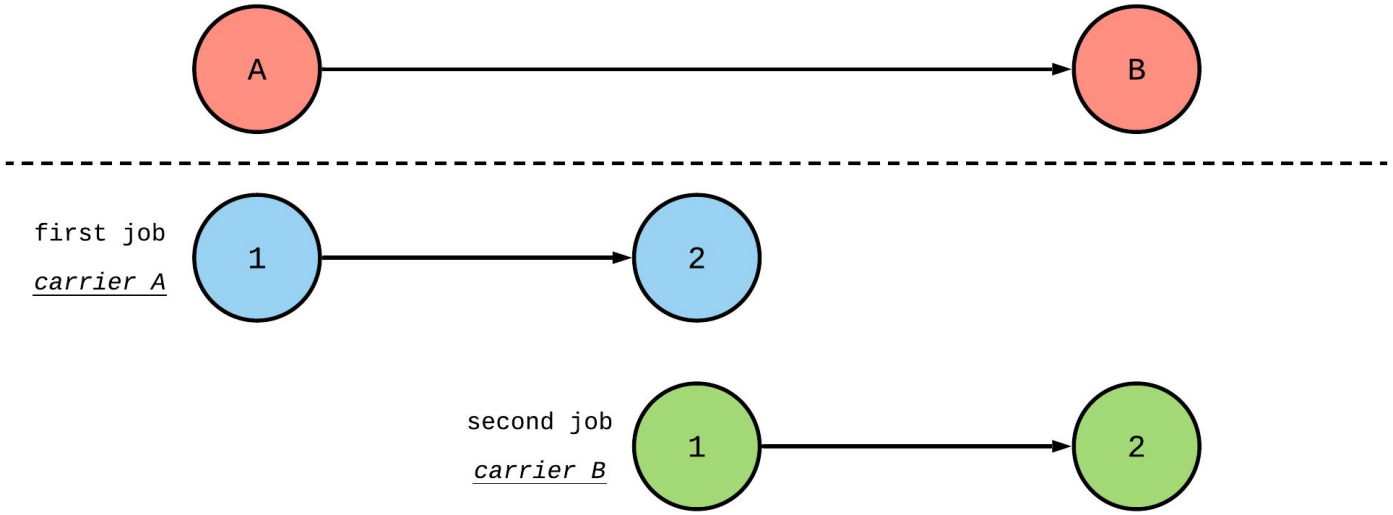
Multi-Driver

At times it makes more sense for a single carrier to have more than one driver move the shipment. Especially for larger carriers, there may be a driver that works within a particular region, and then hands off the trailer to another driver operating in a different region that works for the same carrier.



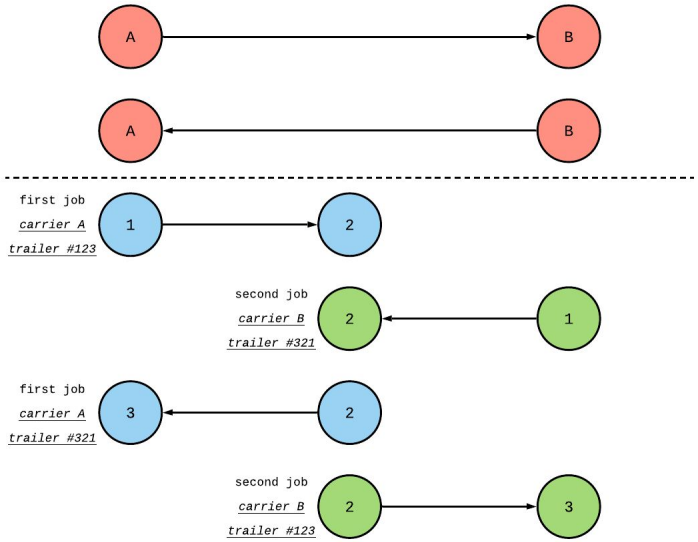
Bundles (AKA Chains)

A grouping of jobs that can be booked as a single unit. These jobs can and often will aid the progression of several loads.



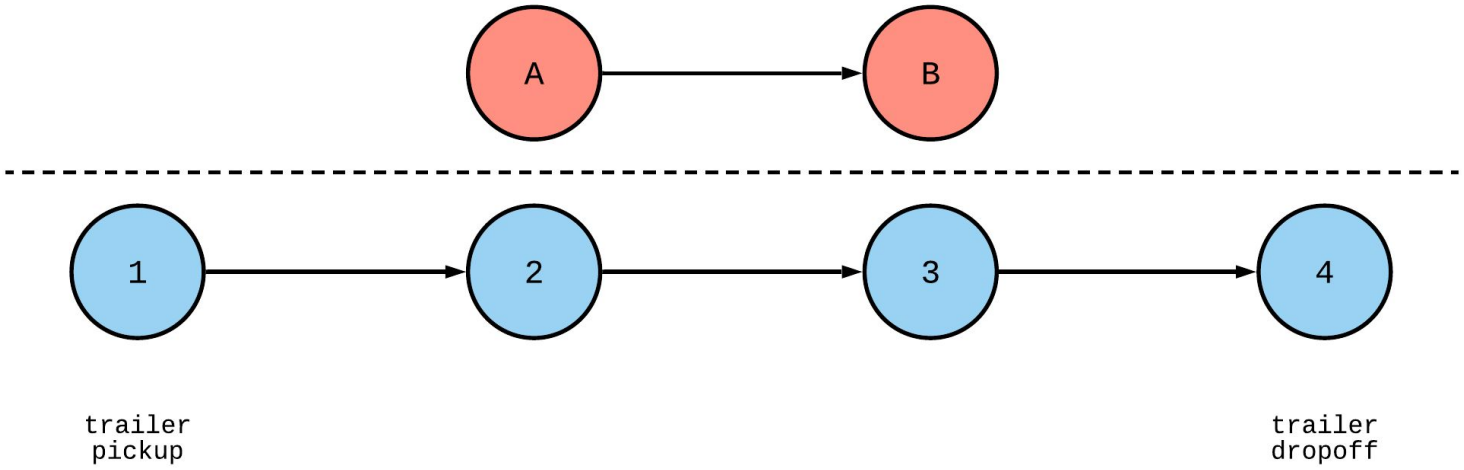
Relays

Fulfilling a shipment using multiple carriers, often times exchanging the trailer. Due to the trailer exchange aspect, it is common that the two carriers share trailers, or leverage the same trailer rental service.



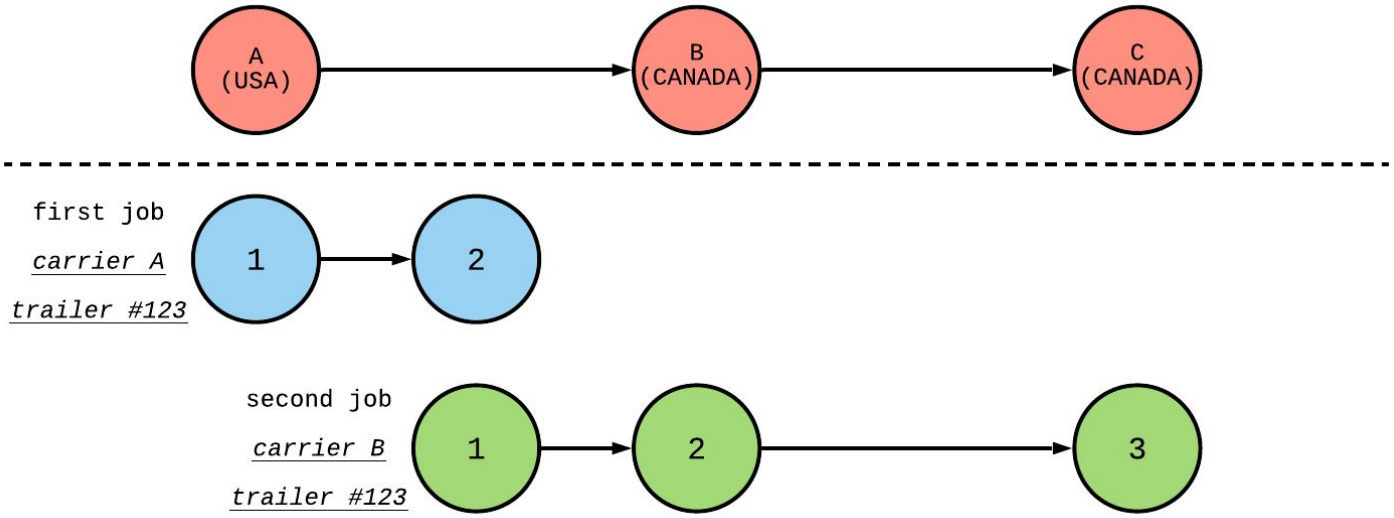
Trailer Swap

A special-case of relay where two loads are completed simultaneously by two drivers through meeting each other between destinations and swapping trailers. This allows each driver to work local to a particular region.



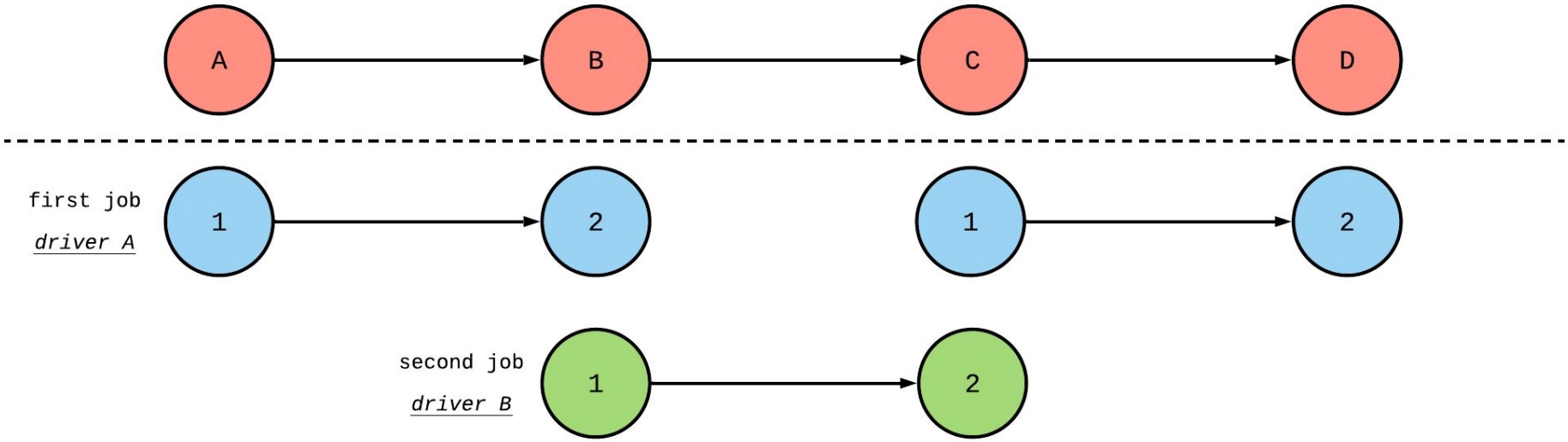
PowerLoop

In order to manage our fleet of PowerLoop trailers, we can instruct pickups and dropoffs of either empty or full trailers in order to distribute trailer availability throughout our network.



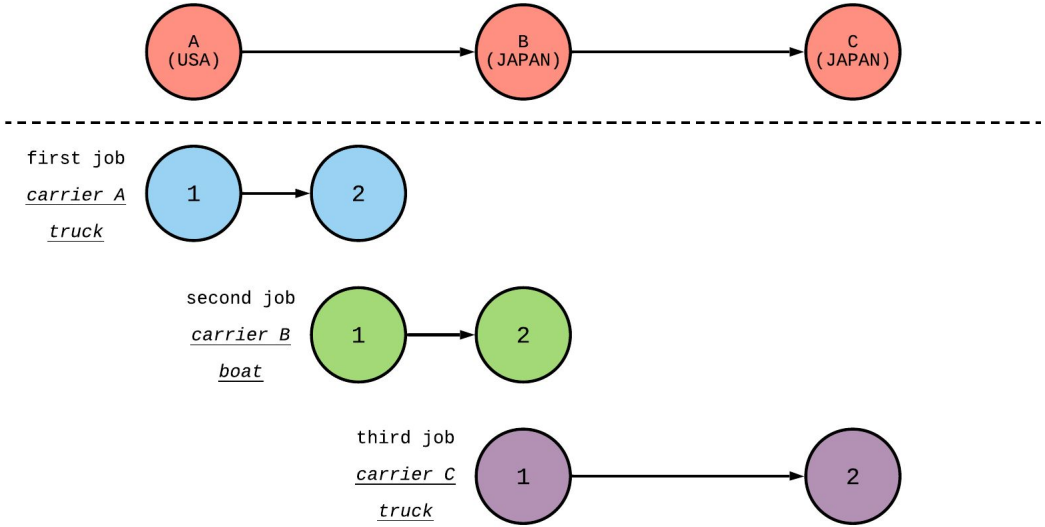
Cross-border

Not every carrier has the authority to cross country lines. In these cases, we can have utilize a special kind of relay where one carrier is met by another at an exchange point nearby the border.



Expedited

In the case of long-haul shipments, carriers can have multiple drivers ride along together, known as **team driving**. These drivers then alternate driving to abide by hours of service (HOS) mandates, resulting in a non-stop movement of the goods.



Intermodal

Shipments sometimes need to span across several modes of transportation, especially when travelling far distances. Different legs of the fulfillment process will be transported via these different modes.

Q&A