ECE 568 ERSS: Final Project
Mini-Amazon / Mini-UPS

Protocol Document

Interoperability Group 7

Group members: Yuchen Yang(yy227), Liwen Deng(ld190), Ziqi Pei(zp33), Yanjia Zhao(yz476), Jiaran Zhou(jz270), Haohong Zhao(hz147), Yifan Li(yl506), Kaiwen Wang(kw284)

Language and Framework:

Our group members SHOULD use **C++** and **Python** to develop their applications. All the related frameworks and libraries such as Django, Boost, and Poco SHOULD be used to facilitate the development process. Django is a high-level Python Web framework that encourages rapid development and clean, pragmatic design. Based on our previous experience, we choose Django as our framework and **PostgreSQL** as our database.

Interface:

Each Amazon and UPS group MUST use Google protocol buffers.
Groups will define message formats in a .proto file, use the protocol buffer compiler and use the Python protocol buffer API to write and read messages.

Possible Interaction Scenarios:

- Amazon & UPS: One side UPS initializes the world and another side Amazon connects to the world.
- Amazon: receive an order, connect to a warehouse and see if there is enough inventory.
- Amazon -> UPS: Send `request_get_truck` with package ID `(shipid)`, warehouse ID `(whid)`, warehouse address (`wh_x, wh_y`), the delivery destination (`destination_x, destination_y`) and an optional UPS account (`ups_account`) for package pickup.
- Amazon -> UPS: pack the order and send `packed` when completed.
- UPS -> Amazon: Prepare and send `response_truck_arrived` containing trucks ID (`truck_id`) and warehouse address (`wh_x, wh_y`) after received `UFinished` from the world.
- Amazon -> UPS: Amazon sends “load truck” to world simulator and sends `request_init_delivery` to UPS containing `package_id, delivery_location`.
- UPS -> Amazon: Deliver all the loaded packages the packages that Amazon requests. After delivering, send `response_delivered` to Amazon when a package is delivered and send `completions` when all deliveries are finished.
- Amazon -> UPS: get tracking information by specifying a `shipid`.
  UPS -> Amazon: return tracking information containing the delivery status and location information.

Protocol Definitions:

- Each communication message MUST have a unique sequence number and SHOULD be acknowledged by the receiver end. Otherwise, the sender SHOULD continuously send the message until receiving the corresponding ack. A timeout mechanism MAY also be applied.
- When an order is placed, Amazon SHOULD send a `whid request_get_truck` to UPS. Then UPS SHOULD send `UGoPickup` message to World.
- When UPS receive `UFinished`, it SHOULD send a `truckid , package_id` and warehouse location to Amazon. Then if Amazon receives this message and has received `APacked` message from World, it SHOULD send `APutOnTruck` message to the world.
- When Amazon receives `ALoaded` message from the world, it SHOULD send truck ID, ship ID and destination to UPS to start delivering. Then UPS SHOULD send `GoDeliver` to World.
- When UPS receive `UDeliveryMade` message from the world, it SHOULD send a confirmation message `(response_destination_changed)` to Amazon to present the completion of this order.
- Amazon MAY send a request to UPS to track the status of order using ship ID. UPS MUST store the status of every order.
- Every `shipid` MUST MAY bind with a UPS account. Users can log in their UPS accounts to see the details of all the packages.

Amazon -> UPS:

// this message is sent from Amazon to UPS when there is a new buy order. It can be parallel with the APack message.

```
Message OrderATruck{
     Required int64 whid = 1;
     Required int64 seqnum = 2;
}
```

// this message is sent from Amazon to UPS when ALoaded message is received.

```
Message PackageLoaded{
     Required int64 shipid = 1;
     Required int64 x = 2;
     Required int64 y = 3;
     Required int64 truckid = 4;
     Required int64 seqnum = 5;
```

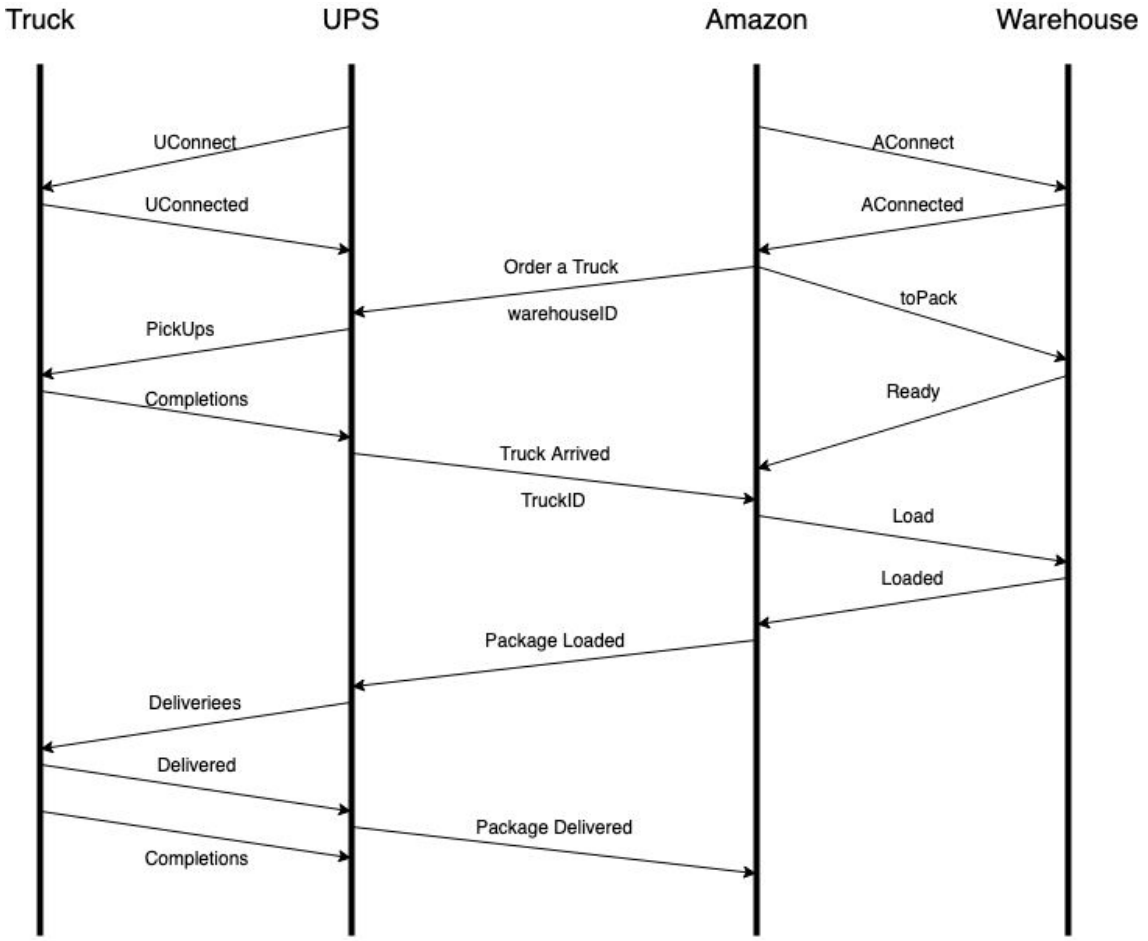
```
}

// UPS needs to bind a package_id with a truck_id
message request_get_truck {
     required int64 order_id = 1;
     optional string ups_account = 2;
     required int32 warehouse_id = 3;
     required int32 location_x = 4;  // warehouse location_x
     required int32 location_y = 5;  // warehouse location_y
     required int32 destination_x = 6; // delivery location_x
     required int32 destination_y = 7; // delivery location_y
}

// Since truck_id is already bound to a package_id, this is
enough.
// loaded and start delivering
message request_init_delivery {
     required int64 package_id = 1;
}

message request_change_destination {
     required int64 package_id = 1;
     required int32 new_destination_x = 2;
     required int32 new_destination_y = 3;
}

message AUCommands {
     optional request_get_truck get_truck = 1;
     optional request_init_delivery init_delivery = 2;
     optional request_change_destination change_destination = 3;
     optional bool disconnect = 4;
}
```

UPS -> Amazon:

```
// this message is sent from UPS to Amazon when a truck has arrived at a warehouse.
Message TruckArrived{
     Required int64 truckid = 1;
     Required int64 seqnum = 2;
}
```

```
// this message is sent from UPS to Amazon when a package is delivered to its destination.
Message PackageDelivered{
     Required int64 shipid = 1;
     Required int64 seqnum = 2;
}

// Send the response to Amazon that truck has arrived at the warehouse
// Change truck status as well.

message response_truck_arrived {
     required int32 wh_x = 1;
     required int32 wh_y = 2;
     required int32 truck_id = 3;
     required int64 package_id = 4;
}

//package has been delivered
message response_package_delivered {
     required int64 package_id = 1;
}

//whether the destination is changed successfully
message response_destination_changed {
     required int32 new_destination_x = 1;
     required int32 new_destination_y = 2;
     required int64 package_id = 3;
     required bool success = 4;
}

message UACommands {
     optional response_truck_arrived truck_arrived = 1;
     optional response_package_delivered package_delivered = 2;
     optional response_destination_changed destination_changed = 3;
     optional bool disconnect = 4;
     optional int64 world_id = 5;
```

}



All communications between UPS and Amazon are bydirectional, including the acknowledgement from the receiver.