# Final Project Report

## Group9

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## 1. Title : Cargo Handlers-Visualizing Port Operations

## 2. Motivations & Backgrounds

This project's allure lies in its potential to construct a dynamic, immersive environment that mirrors the bustling activity within a port. Through graphics programming, it's possible to visualize the seamless interplay between gantry transporter and container trucks, depicting their synchronized movements in handling cargo.

Moreover, this project presents an opportunity to capture the essence of real-world port operations. By simulating these elements in an interactive OpenGL environment, it allows for a deeper understanding of the complexities involved in logistics management. The visual representation of cargo handling processes, including loading and unloading operations, offers a glimpse into the efficiency and coordination necessary for smooth port functioning.
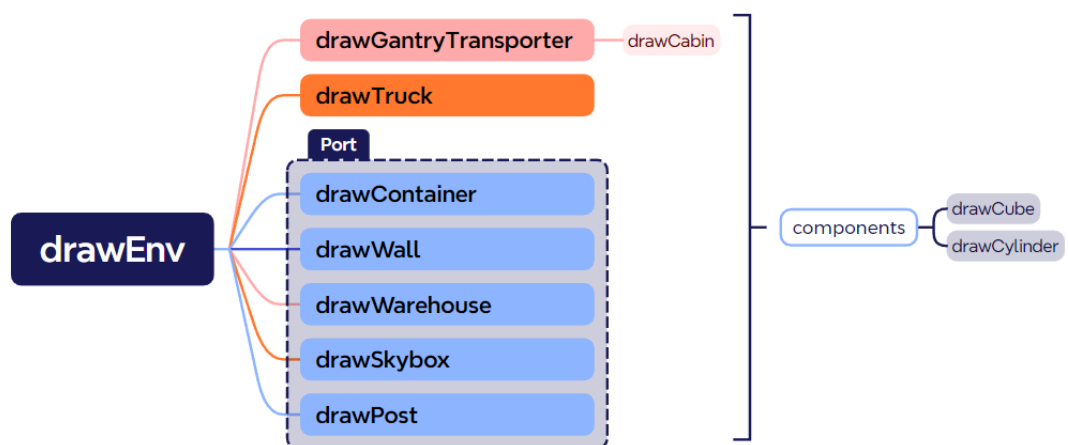
# 3. Port Operations

In today's global trade, port operations are a critically important and intricate component. Port operation refers to the activities and processes involved in managing the departure, and handling of cargo, and goods at a port.
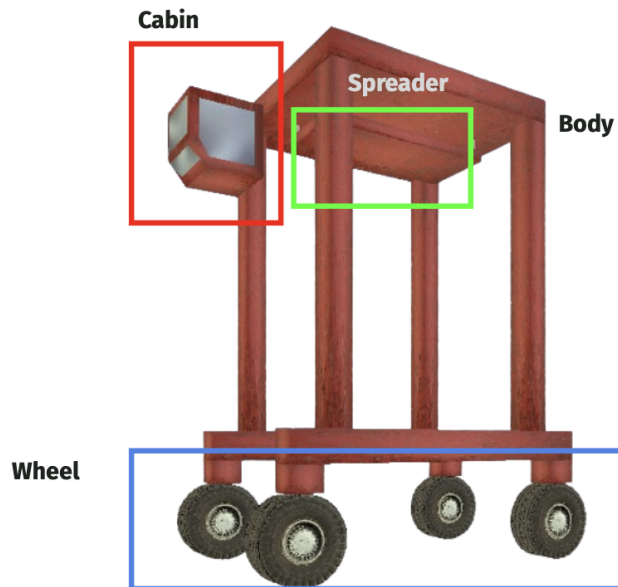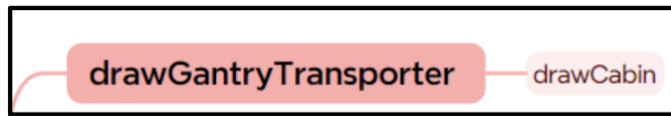
- **Important component in port operation**
  - **Gantry Transporter (吊車)**
  - **Container Truck (卡車)**
  - **Port**



# 4. Render Overview

- **Gantry Transporter**





We adopted a method similar to that used in HW1.

- In Gantry Transporter we render **Four** parts:
    1. Cabin - customize polyhedron
        - Metal
        - Window
    2. Spreader - element is manipulable
        - **Board**
            - **up**/**down** **by** **PageUp**/**PageDown**
            - **catch /drop** **by** **space**
        - **Chain - length is follow with board**
    3. **Wheels**
    4. **Body**

# 5. Texture and Light

## We render textures on the skybox and components:

- We adopted a method similar to that used in HW2 and HW3.
- The container texture will be randomly rendered onto one of the 12 containers' textures.

## implementation of light:

- We adopted a method similar to that used in HW2
- To simulate difference between day and night
    - Ambient, Diffuse, Specular, Position, Spot Direction
- Light could be Turn on and off by L/l (lower case)

# 6. Camera Position

## Three different shot

- We implement three different view positions: Gantry Transporter, truck and free camera.
- The viewpoint could be switched by 0/1/2 respectively.
- The camera angle could be operated by mouse.

# 7. Port Operation: departure & handle containers

We implemented a fountain to catch/departure containers by gantry transporter.

    i.   **Drop down spreader until reach the container**

    ii.   **Move gantry transporter to meet truck**

    iii.   **Drop the container on the truck and go**
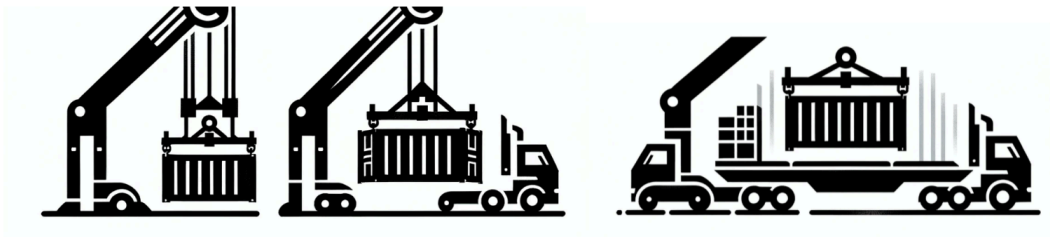


# 8. Conclusions

- We successfully simulate basic port operation by the main three components.

| Render | Gantry Transporter | catch/drop | space |
|---|---|---|---|
| | | up/down | PageUp/PageDown |
| | | move | w/a/s/d |
| | Truck | move | w/a/s/d |
| | Port | /***infrastructure***/ | |
| | Texture | /***Above three, skybox***/ | |
| Control | Light | on/off | L/l |
| | Camera | gantry/truck/free | 1/2/3 |
| | | angle | mouse |