



## **SIMULTRA PROJECT**

2017-1-IT01-KA202-006140



## **SIMULATION OF LOGISTICS AND TRANSPORT PROCESSES**

### **INTELLECTUAL OUTPUT **A.5.7****

#### **Container Terminal operation Game Manual [4-3-2019]**

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## 1. INTRODUCTION

This manual will give the players of the container terminal game a short introduction of the game.

Also the instruction on how to install the game are given as well as the registration to the game. Also the explanation on how the play the game is given.

## 2. What is the container terminal Game (CTG)

The simulator allows planning and organization of all (human) resources and equipment (fixed and self-propelled cranes) necessary for the management of a ship arriving at the quay of a container terminal. It aims to facilitate and perform the unloading and loading operations of containers in the time window required by the port's operations. The simulated process refers to the task mainly carried out by the container terminal resource planner.

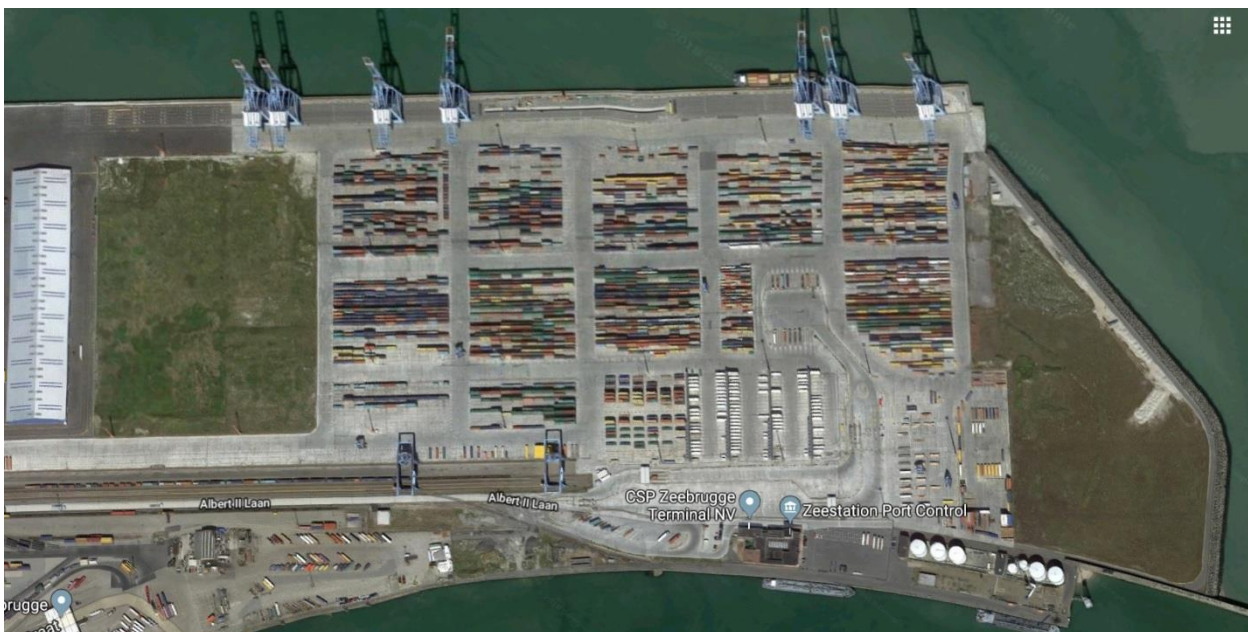
### Important terms

The player need to be familiar with the following terms;

- Container Terminal
- TEU-Container
- Container Ship
- Straddle Carrier
- Container Gantry Crane

### 2.1 Container Terminal

A container port and more particularly a container terminal is a facility where cargo containers are transhipped between different transport vehicles, for onward transportation. The transshipment may be between container ships and land vehicles, for example trains, barges or trucks, in which case the terminal is described as a maritime container port. Alternatively, the transshipment may be between land vehicles, typically between train and truck, in which case the terminal is described as an inland container port.



## 2.2 TEU – Container

The twenty-foot equivalent unit (often TEU or teu) is an unit of cargo capacity often used to describe the capacity of container ships and container terminals. It is based on the volume of a 20-foot-long (6.1 m) intermodal container, a standard-sized metal box which can be easily transferred between different modes of transportation, such as ships, trains and trucks.



## 2.3 Container Ship

Container ships are cargo ships that carry all of their load in truck-size intermodal containers, in a technique called containerization. They are a common means of commercial intermodal freight transport and now carry most seagoing non-bulk cargo.



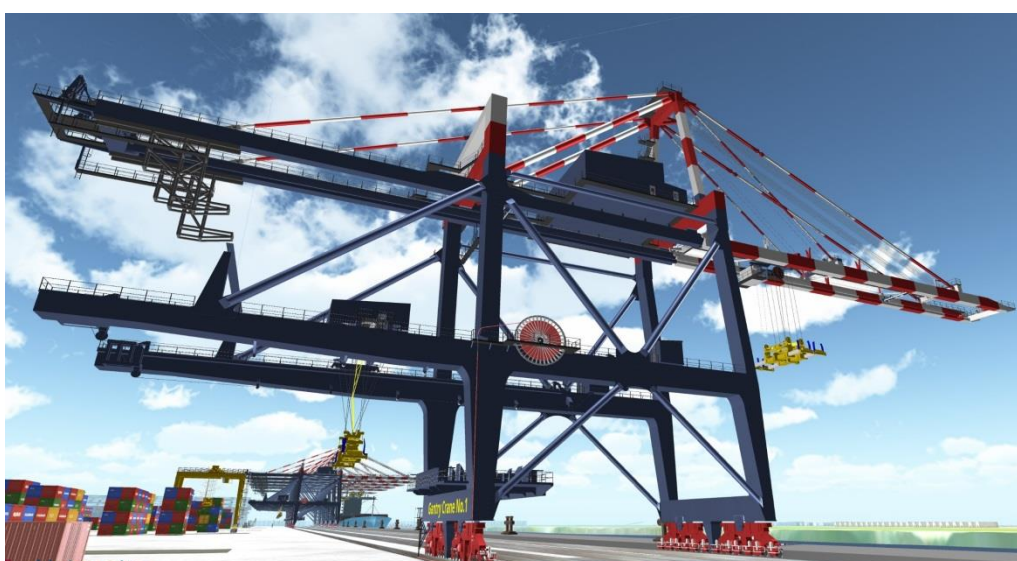
## 2.4 Straddle Carrier

Generally, a straddle carrier is a term for a vehicle for use in port terminals and intermodal yards that are used for stacking and moving standard containers.



## 2.5 Container Gantry Crane

A container crane (also container handling gantry crane or ship-to-shore crane) is a type of large dockside gantry crane found at container terminals for loading and unloading intermodal containers from container ships. Container cranes consist of a supporting framework that can traverse the length of a quay or yard on a rail track. Instead of a hook, they are equipped with a specialized handling tool called a spreader. The spreader can be lowered on top of a container and locks onto the container's four locking points ("corner castings") using a twist lock mechanism. Cranes normally transport a single container at once, but some newer cranes have the capability to pick up two to four 20-foot containers at once.





## 2.6 Calculating the container terminal cost and time

The operational cost elements of the container terminal consist out of the following elements

- Container crane cost
  - o Crew
  - o Energy
- Straddle cost
  - o crew
  - o Energy

### COST

#### Container crane cost details

The crew cost are calculated by:

**CCrew = Number of crews\* 8 hours (fixed time a crew)\* cost per hour for a crew**

The crane energy cost are calculated by:

**CEnergy = Number of cranes\* time crane used \* energy cost per hour for a crane**

#### Straddle crane cost details

The crew cost are calculated by:

**CCrew = Number of straddles \* Total time needed by the straddle carrier \* cost per hour for a crew**

The crane energy cost are calculated by:

**CEnergy = Number of straddles \* Total time needed by the straddle carrier \* energy cost per hour for a Straddle carrier**

## TIME

### Container crane time details

The total handling speed of the container crane

**TCont = Number of containers to be handled / (Number of deployed container cranes \* handling speed container crane)**

Handling speed container crane

**Handling speed container crane = if (handling\_speed\_container\_crane\_MAX < number of straddle \* T Straddle, then, handling\_speed\_container\_crane\_MAX, else, number of straddle \* T Straddle)**

### Straddle carrier time calculation

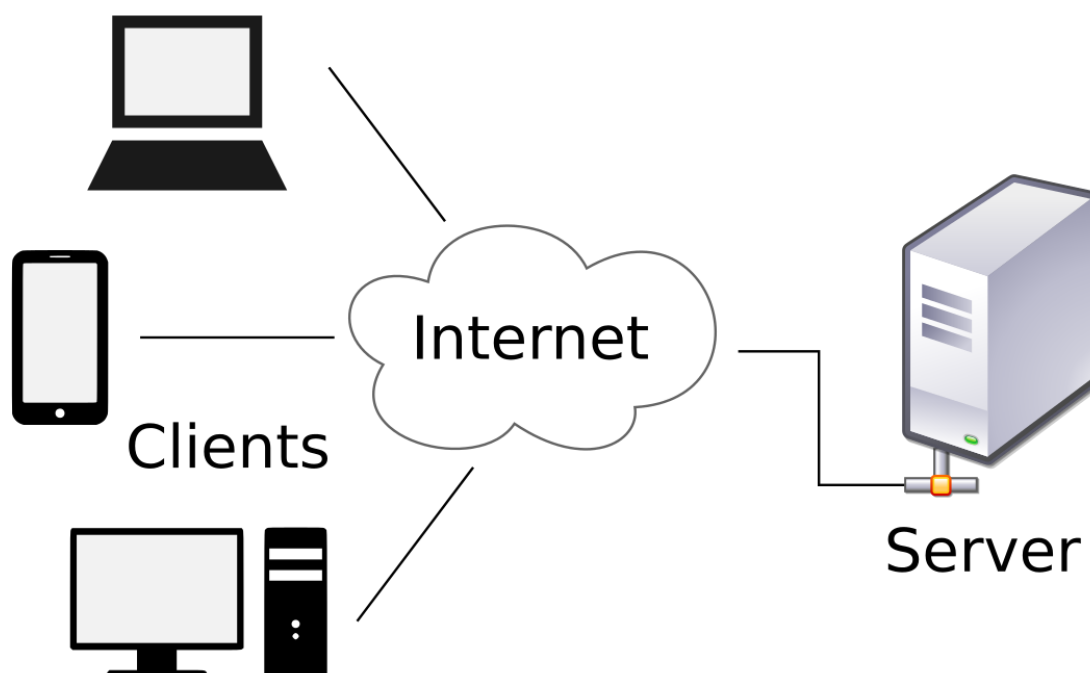
The time needed for a straddle to make a full loop on the terminal (1 straddle for one container)

**TStraddle = 2 \* Distance travel / speed of the straddle**



### 3. SCMG structure

The supply chain management game is made with 'Unity engine' and uses C# language programming. The game is server-based and all user information and databases are located on the Linux server. PHP language is used as a means of communication between game and server or SQL database.

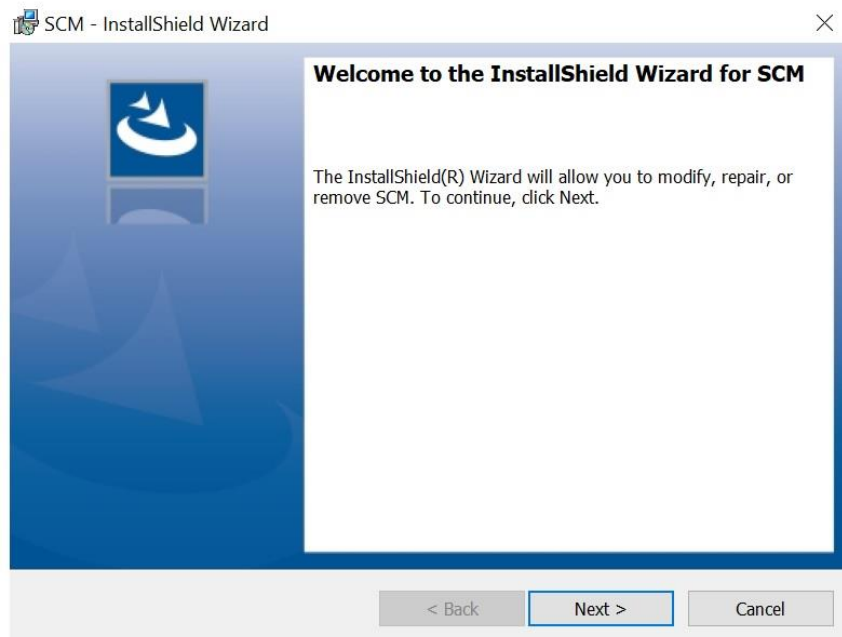


#### 4. SCM installation

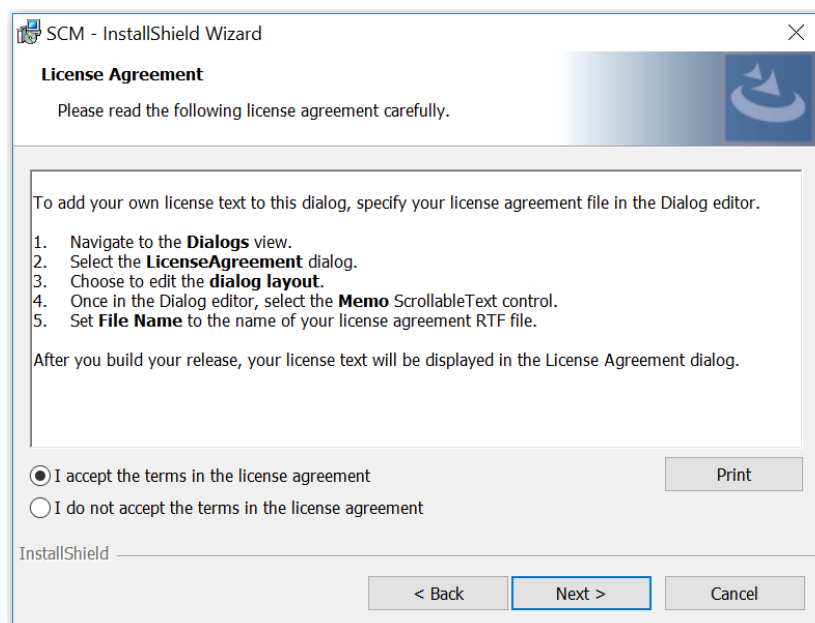
SCM Installer file is 133 MB; installation starts by double-clicking on the “Supply Chain Manager 01.msi” installer file.

	SupplyChain Manager 01.msi Type: Windows Installer Package	Date modified: 2/5/2019 3:52 PM Size: 133 MB
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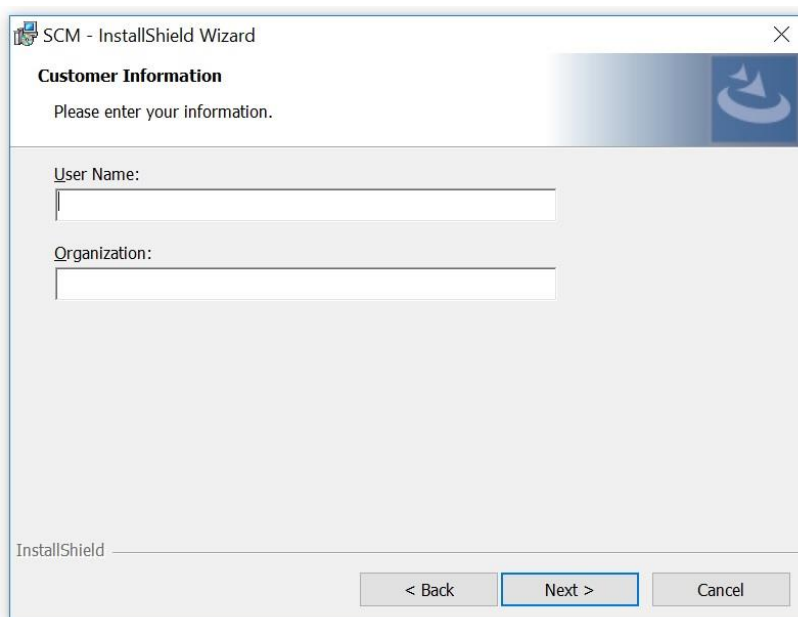
In the ‘welcome window’, click ‘Next’ button.



In the ‘License agreement window’, accept license agreement by clicking on the appropriate radio button. Afterwards, click on the ‘Next’ button.

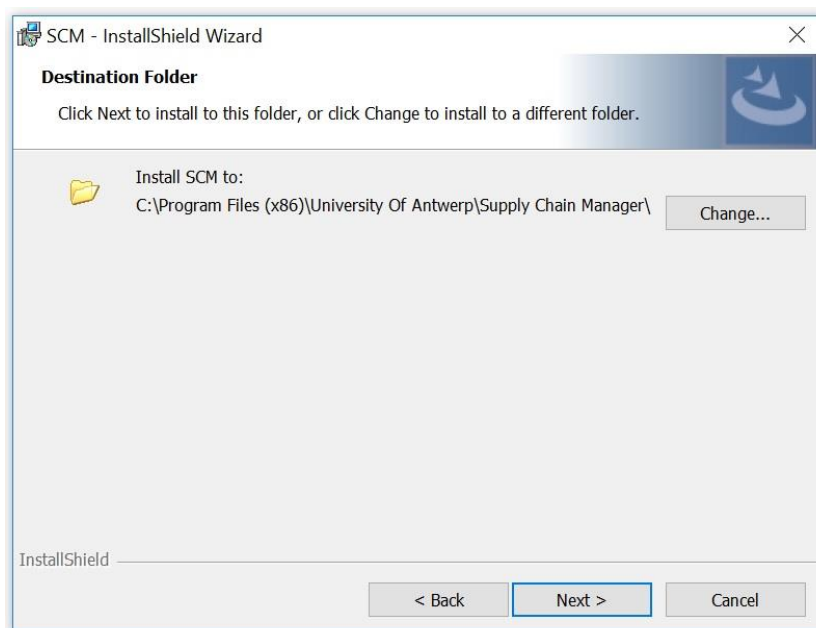


Enter your User Name and your Organization name in the following window and click on the 'Next' button.



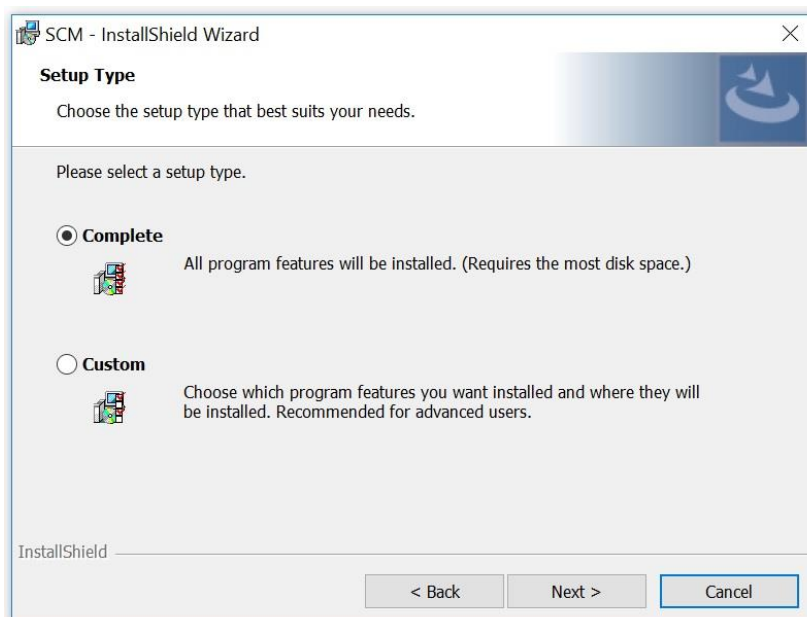
The screenshot shows the 'Customer Information' window of the 'SCM - InstallShield Wizard'. The window has a title bar with the text 'SCM - InstallShield Wizard' and a close button. Below the title bar, the text 'Customer Information' is displayed, followed by the instruction 'Please enter your information.' There are two text input fields: 'User Name:' and 'Organization:'. At the bottom of the window, there are three buttons: '< Back', 'Next >', and 'Cancel'. The 'Next >' button is highlighted with a blue border.

Change the installation folder in the below window if necessary, otherwise click on the 'Next' button.

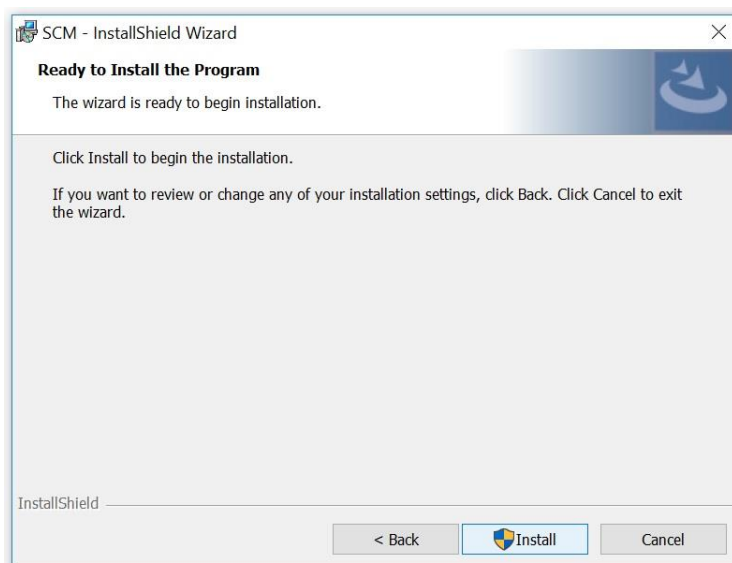


The screenshot shows the 'Destination Folder' window of the 'SCM - InstallShield Wizard'. The window has a title bar with the text 'SCM - InstallShield Wizard' and a close button. Below the title bar, the text 'Destination Folder' is displayed, followed by the instruction 'Click Next to install to this folder, or click Change to install to a different folder.' There is a folder icon and the text 'Install SCM to: C:\Program Files (x86)\University Of Antwerp\Supply Chain Manager\'. To the right of this text is a 'Change...' button. At the bottom of the window, there are three buttons: '< Back', 'Next >', and 'Cancel'. The 'Next >' button is highlighted with a blue border.

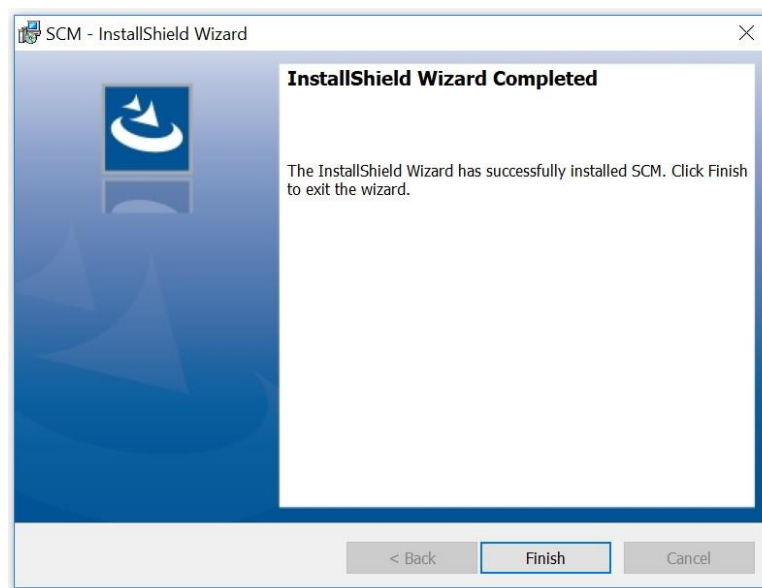
In the 'Setup Type' window, select 'Complete' and click on the 'Next' button.



In the following window, installation will begin by clicking on the 'Install' window.



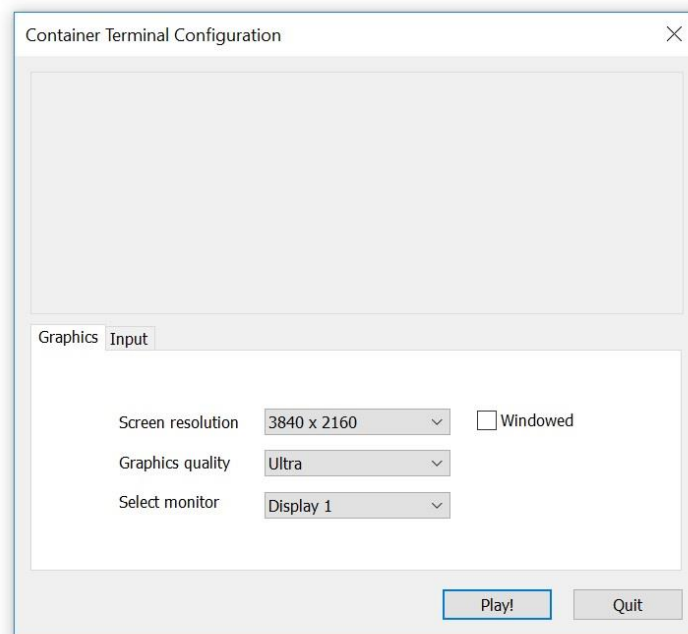
Installation will be terminated by clicking on the 'Finish' button.



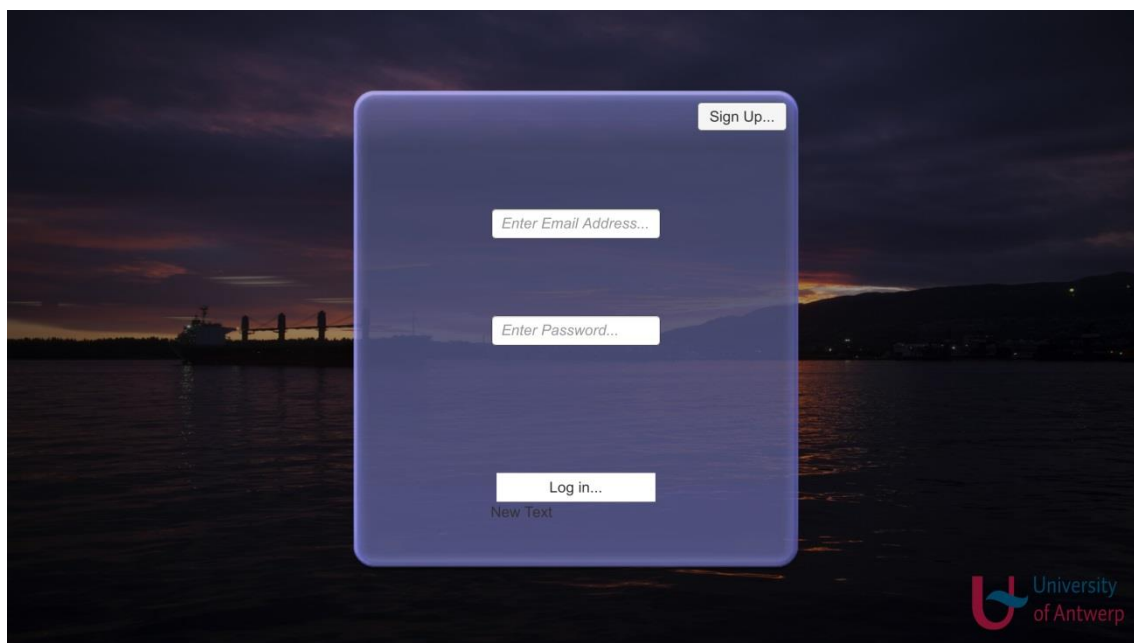
A starting icon will be created on the desktop automatically.

## 5. CTG Registration and Login

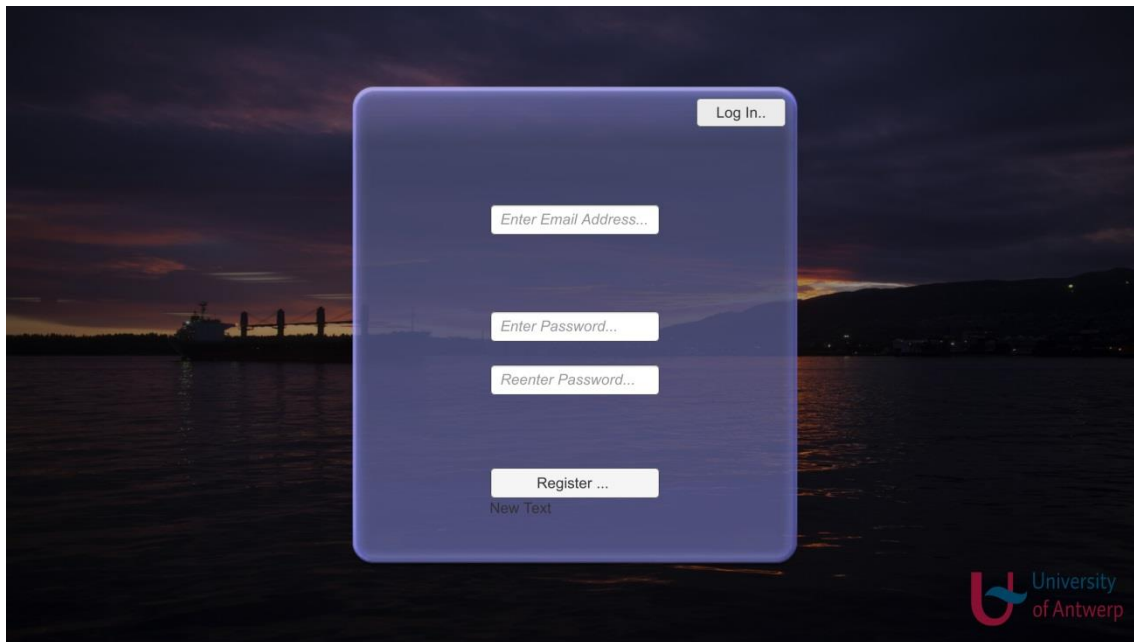
Run the 'Container terminal game' by double-clicking on the corresponding Icon on the desktop. In the 'Container Terminal configuration' window, click on 'Play' in order to start the game.



If you are not registered, click on the 'Sign up...' button top right of the window in order to register on the server.



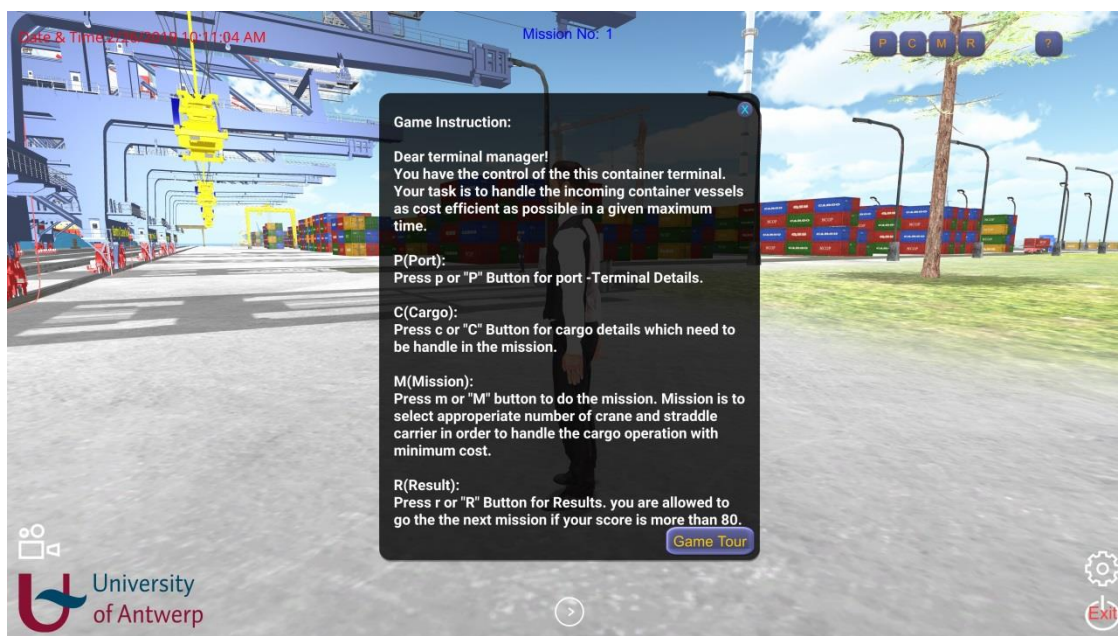
In the registration window, enter a valid email address, choose a password and re-enter the password again. Then click on the 'Register...' button.



After registration, click on the 'Log in..' button top right of the window, and in the "Login" window, enter your e-mail and password. Then click on 'Log in...' button.

Welcome to the Container Terminal....!

Read the instruction on the first page and click on the 'Game Tour' button in order to be familiar with the terminal environment.





## 6. How to play the CTG

### 6.1 Game mission

You have the control of the container terminal. The mission is by considering the port equipment, cargo details and available time, to finally select the appropriate number of cranes and straddle carriers in order to handle the cargo operation with minimum cost and allowable time. In other words, the task is to handle the incoming container vessels as cost efficiently as possible in a maximum given time.

In this level of the game, open both the 'Mission Details' and 'Mission Results' windows. Doing so allows seeing the results while changing the number of equipment such as cranes or straddle carriers. One is allowed to go to the next mission if one's score is more than 80.

### 6.2 Controls on the game

To move inside the port, by pressing the arrow keys, the selection moves between individual directions, either forward or backward, or left or right, depending on the arrow key one presses. By moving mouse left and right, one can rotate the player inside the terminal.

- Press 'ESC' to freeze the game. Press 'ESC' again to unfreeze the game.
- Press 'Ctrl' or '1' to change the Main Camera, and look at the terminal and vessel from a different angle.
- P(Port): Press 'p' or the 'P' Button to see the port specification (Terminal Details) window.



- C(Cargo): Press 'c' or the 'C' Button to see the cargo details window which need to be handled in the mission.

Cargo Details		
Vessel Name:	Oxford	
Vessel LOA:	110	Metre
Vessel Width:	50	Metre
Vessel Draft:	20	Metre
Vessel Capacity:	5000	TEU
TEU to be Load:	200	No.
TEU to be Unload:	300	No.
TEU to be Shift:	50	No.
Cargo Handling T:	24	Hour
S. C. LoopDist:	1000	Metre

- M(Mission): Press 'm' or the 'M' button to see the 'Mission Details' window.

Mission Details	
Select No Of Crane:	3
No. Shift for Crane1:	1
No Straddle for Crane1:	2
No. Shift for Crane2:	2
No Straddle for Crane2:	2
No. Shift for Crane3:	2
No Straddle for Crane3:	2
<b>Start Cargo Handling</b>	

- R(Result): Press 'r' or the 'R' Button to see the 'Results' window.

Date & Time: 2/26/2019 10:30:19 AM Mission No: 1

### Mission Results

Mission Number: New Text

Cargo Handling Time:	16	Hour	Max:	24
Crane No. 01 Output:	40	Move/H	Max:	50
Crane No. 02 Output:	40	Move/H	Max:	50

Total Crane Energy Cost:	2100	Euro
Total Crane Crew Cost:	28800	Euro
Total Straddle Energy Cost:	2100	Euro
Total Straddle Crew Cost:	5280	Euro
Total Cargo Operation Cost:	38280	Euro
Min Cargo Operation Cost:	25520	Euro
Score:	50	Of 100

Comment 01: Completed cargo handling

Comment 02:

### Mission Details

Select No Of Crane: 2

No. Shift for Crane1: 1

No Straddle for Crane1: 2

No. Shift for Crane2: 2

No Straddle for Crane2: 2

Start Cargo Handling

University of Antwerp

## 7. CTG Score

The user score can be seen from the 'Mission Results' window. The score is between 0-100. If a user is able to finish the cargo handling with the minimum cost, the score will be 100. Accordingly, if the user spends more money for cargo operation than the minimum cost, the score will drop toward zero.

The aim of this game to get a score as close to 100 as possible.