Nodes explanation:

1. VesselHull: The shape of the boat itself, therefore it has only has spatial dependencies (installed)
2. Rudder: The mechanism to steer the boat, the decision making algorithm has a dependency with this since this algorithm decides the direction (installed)
3. Rudder actuator/controller (takes energy from battery, information from pc and actuates the rudder (mechanical energy))
4. Electric motor: The engine of the boat, so it powers the propellers and draws power from the battery. Also the decision making algorithm has a dependency with this since a boat might need to break or accelerate (not installed)
5. Electric motor controller
6. 880 Volt batteries: 2 batteries for the electric supply for components such as the heating, computers, pumps and cooling water. It gets charged by the electric motor (installed)
7. 24 Vdc batteries: 2 batteries for the electric supply for components such as navigation, communications and lights (installed)
8. 880V to 230V converter
9. 230V to 24V converter
10. Propellers: Produces the main forward thrust and can thus be used to accelerate and break the boat, it gets powered by the electric motor (installed)
11. Bow thruster: Produces sidewards thrust and is thus mainly used to dock the boat, it gets powered by the battery and the decision making algorithm can use this as well (not installed)
12. Bow thruster controller
13. UPS: uninterruptible power supply which supplies systems such as emergency lighting, communication, radio, navigation, loudspeaker, PCs and servers (installed)
14. Workstation PC: All software is runned on this PC, which means it has dependencies with all sensors, it gets powered by the battery (installed)
15. Short term perception algorithm: Algorithm to decide for decisions in close range (e.g. other boats or objects on the route), all perception sensors are connected to this (installed)
16. Long term perception algorithm: Algorithm to plan the main route from A-B, all location sensors are connected to this and (installed)
17. Strategic path planning: Path planning which is associated to the long term perception algorithm (installed)
18. Tactical path planning: Path planning which is associated to the short term perception algorithm (installed)
19. Decision making algorithm: Uses both path planning to make a decision what the boat should do (installed)
20. RGB cameras: Perception component which is used to know how the surroundings look like (installed)
21. IR cameras: Perception component to see the surrounding temperatures, mainly used with bad vision when the rgb cameras don’t work properly (installed)
22. Lidar camera: Perception component to know the distances of surrounding objects (installed)
23. Marine radar: Perception component to know the location of surrounding boats on a long distance (installed)
24. Wind sensor: Sensor to measure the wind direction and strength (installed)
25. Forward sonar: Perception component to know the distances of foreign objects, submarines etc at depth under sea level (not installed)
26. Depth sounder: Sensor to measure the depth of the sea level (not installed)
27. Battery management system: System to manage the battery level such as heat, currents and voltage to get a more efficient battery (installed)
28. GPS receiver: Location sensor to know the current location of the boat (installed)
29. Weather station: Station to measure current weather status (installed)
30. IMU: Combined sensor with a gyroscope, acceleration sensor and magnetic field sensor (installed)
31. Peplink router: Router to receive 4G and 5G signals (installed)
32. AIS: System to receive ship data such as location, direction and speed (installed)
33. Ethernet gateway: Gateway to provide the 4G and 5G internet connection to the components that need it such as the workspace PC (installed)
34. VHF channel: Antenne to receive the very high frequencies which is needed for the AIS. (installed)
35. Navigation lighting: lighting which indicates the side of each boat, green for starboard, red for port and white for stern (installed)
36. Log sensor: Sensor to measure the speed of the boat (installed)
37. Battery charge system: charges the batteries with energy from the shore.
38. Steering wheel: Wheel to steer in which direction the boat will go (installed)
39. Manual gas: Throttle to manually thrust the boat in forward direction (installed)
40. Directional thruster: Throttle to manually thrust the boat in left and right directions (installed)

Dependencies:  
Energy (we will label between 880VDC 230VAC and 24VDC later)  
Information Signal (all the signal/information flows (label high and low bit rate later)  
Spatial dependency (spatial connections of importance between parts)

Scenario’s: Different scenario’s can be combined to make up the individual use case.

-Undocking

-Sailing at a busy waterway

-Sailing in a calm waterway

-Sail in inland waterways

-Sailing at open water

-Sailing at daytime

-Sailing at night

-Sailing in undeep waterways

-Sailing in a deep waterway

-Docking