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(54) **METHODS FOR AUTOMATICALLY OPTIMIZING SHIP PERFORMANCE AND DEVICES THEREOF**

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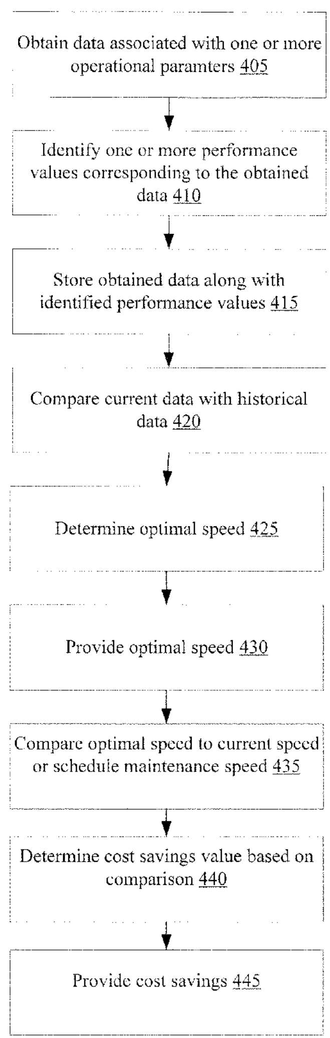
(57) **ABSTRACT**

A method, non-transitory computer readable medium and performance optimization computing device for optimizing the performance of a ship. Data associated with one or more operational parameters associated with the ship is obtained. One or more performance values corresponding to the obtained data are identified. One or more optimal operational parameters are determined based on a comparison of the identified one or more performance values and one or more historical performance values. The historical performance values correspond to historical data associated with the one or more operational parameters. The determined one or more optimal operational parameters for the ship are provided.



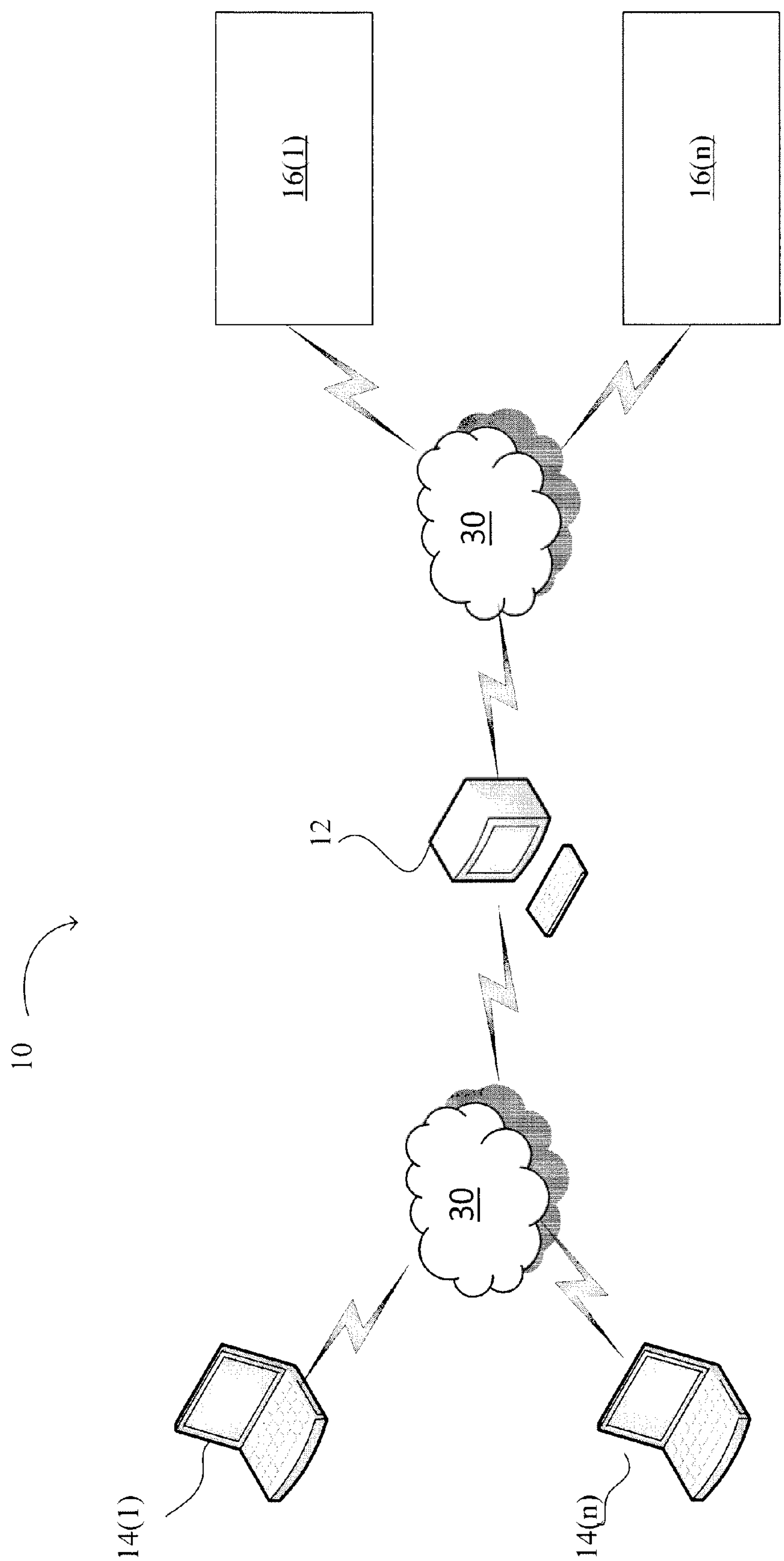



FIG. 1

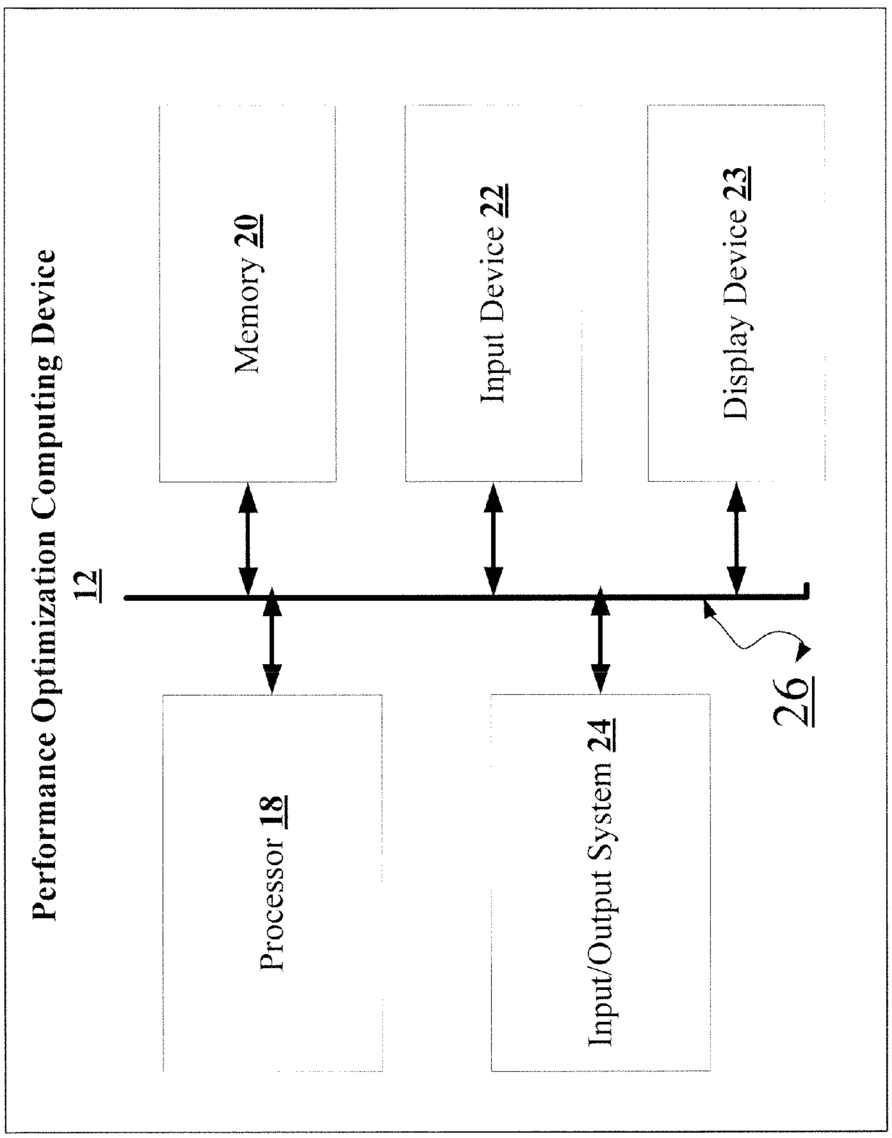

Performance Optimization Computing Device
12
Memory 20
Input Device 22
Display Device 23
Processor 18
Input/Output System 24
26

FIG. 2

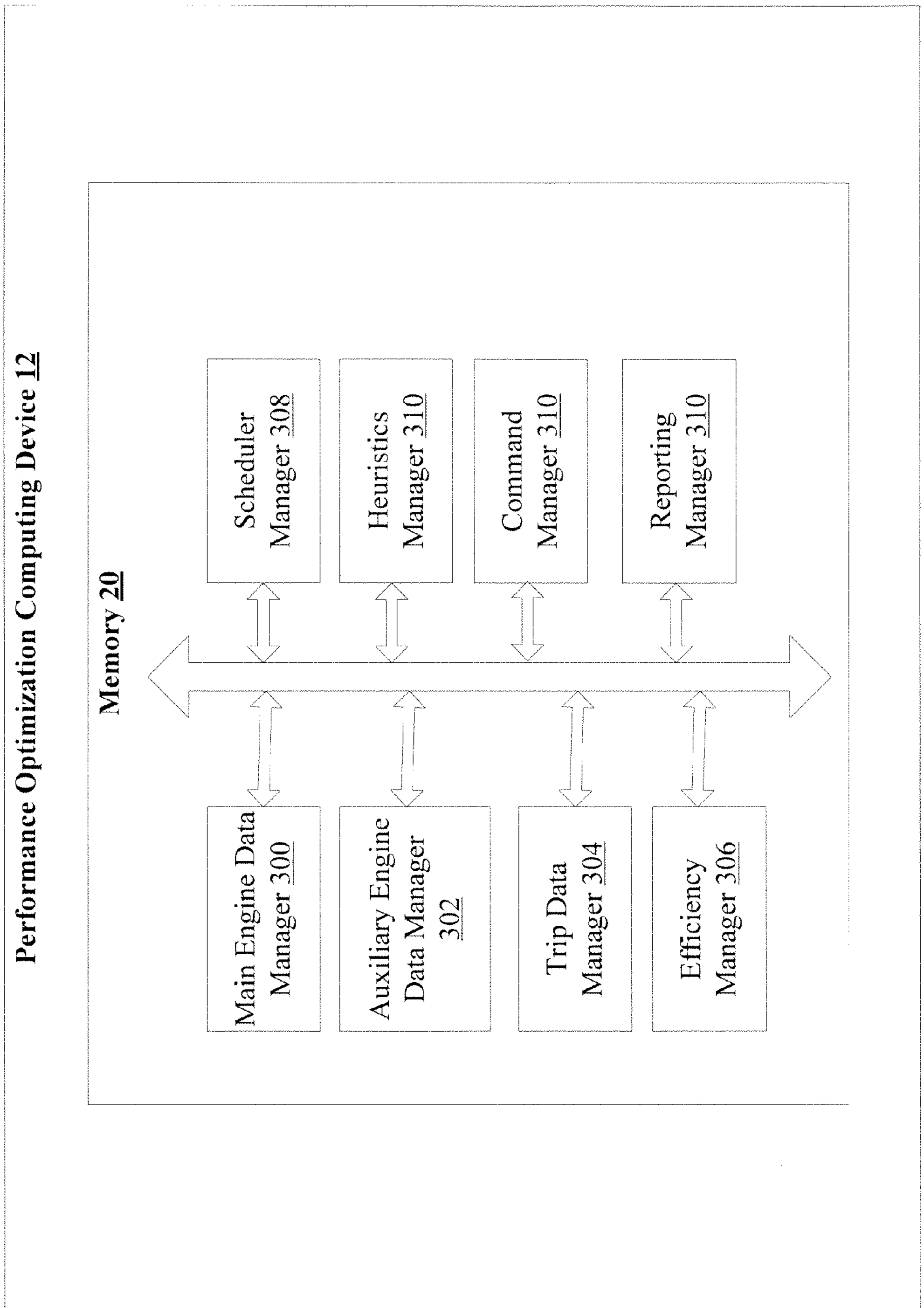

Performance Optimization Computing Device 12
Memory 20
Main Engine Data Manager 300
Auxiliary Engine Data Manager 302
Trip Data Manager 304
Efficiency Manager 306
Scheduler Manager 308
Heuristics Manager 310
Command Manager 310
Reporting Manager 310

FIG. 3

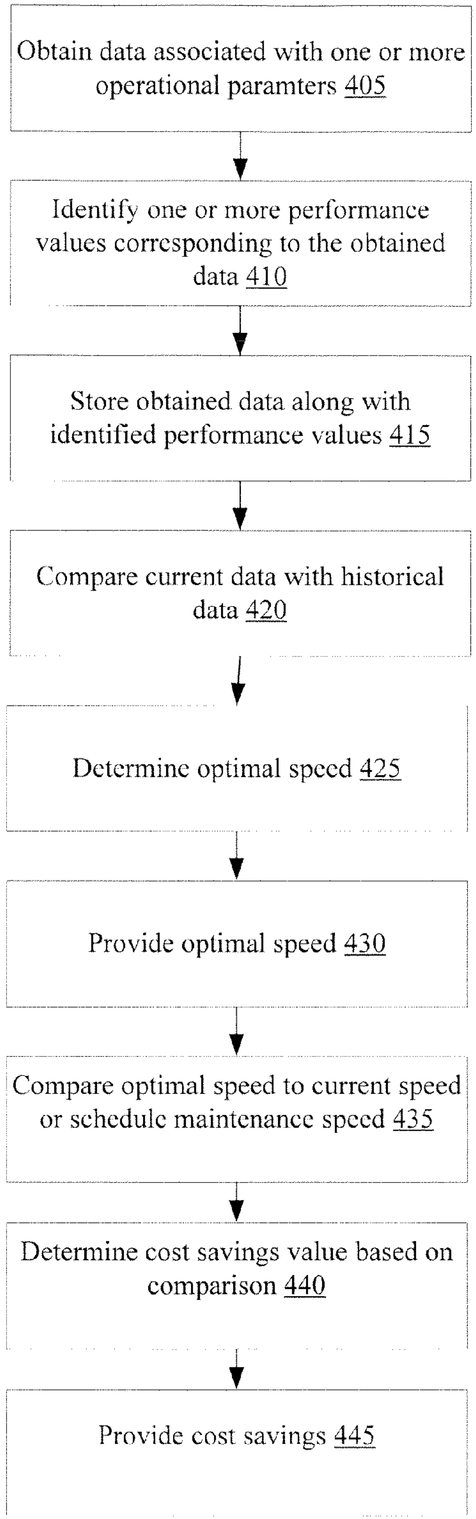

Obtain data associated with one or more operational paramters 405
Identify one or more performance values corresponding to the obtained data 410
Store obtained data along with identified performance values 415
Compare current data with historical data 420
Determine optimal speed 425
Provide optimal speed 430
Compare optimal speed to current speed or schedule maintenance speed 435
Determine cost savings value based on comparison 440
Provide cost savings 445

FIG. 4

# METHODS FOR AUTOMATICALLY OPTIMIZING SHIP PERFORMANCE AND DEVICES THEREOF

**[0001]** This application claims the benefit of U.S. Provisional Patent Application Ser. No. 61/821,724 filed May 10, 2013, which is hereby incorporated by reference in its entirety.

## FIELD

**[0002]** This technology relates to methods for optimizing ship performance and devices thereof.

## BACKGROUND

**[0003]** Optimizing ship performance results in the reduction of total vessel fuel consumption and costs and the maximization of vessel profitability. Fuel consumption is based on the operational parameters of the ship, such as by way of example only actual engine and generator performance. Fuel consumption is related to both the amount of fuel required for propulsion of the ship throughout its journey, as well as the fuel needed to power necessary equipment aboard the ship during the ship's voyage. The optimal ship speed must balance the benefits of slowing down the ship in order to save propulsion fuel with the associated costs of the additional electrical load impact (i.e., the power required to operate necessary equipment) on fuel consumption resulting from the excess time required to make the voyage at the slower rate of speed. This optimal speed may also take into account the opportunity for optimizing vessel profit through greater revenue by performing more voyages, if there is additional unmet demand. Further, ship performance may be improved based on the configuration and utilization of various power sources.

**[0004]** Currently available technologies for determining optimal ship speed or power source configuration and utilization typically are based on a static analysis that is performed either when an engine is being tested at the factory before being shipped or on a ship during the initial sea trials. These calculations are often performed as manual calculations using approximate data.

**[0005]** After the factory testing and initial sea tests, the optimal operational profile of the ship will change as the vessel and onboard equipment wear, age, are maintained, are operated, etc. Each vessel will look slightly different and the optimal operation parameters will change over time. The existing technologies do not account for these various changes in the operational profile of the ship, which directly relate to the optimal speed and power source configuration and utilization. These existing technologies are based on the prior, static analysis and lack any real-time analysis of the optimal ship performance based on the real-time operational parameters (i.e., current condition) of the ship.

## SUMMARY

**[0006]** A method for optimizing ship performance includes obtaining, by a performance optimization computing device, data associated with one or more operational parameters associated with the ship. One or more performance values corresponding to the obtained data are identified. One or more optimal operational parameters are determined based on a comparison of the identified one or more performance values and one or more historical performance values. The historical performance values correspond to historical data associated with the one or more operational parameters. The determined one or more optimal operational parameters for the ship are provided.

**[0007]** A performance optimization computing device includes a memory coupled to one or more processors which are configured to execute programmed instructions stored in the memory including obtaining data associated with one or more operational parameters associated with the ship. One or more performance values corresponding to the obtained data are identified. One or more optimal operational parameters are determined based on a comparison of the identified one or more performance values and one or more historical performance values. The historical performance values correspond to historical data associated with the one or more operational parameters. The determined one or more optimal operational parameters for the ship are provided.

**[0008]** A non-transitory computer readable medium having stored thereon instructions for optimizing ship performance comprising machine executable code which when executed by at least one processor causes the processor to perform steps including obtaining data associated with one or more operational parameters associated with the ship. One or more performance values corresponding to the obtained data are identified. One or more optimal operational parameters are determined based on a comparison of the identified one or more performance values and one or more historical performance values. The historical performance values correspond to historical data associated with the one or more operational parameters. The determined one or more optimal operational parameters for the ship are provided.

**[0009]** This technology provides a number of advantages including providing more effective methods, devices, and non-transitory computer readable media for optimizing ship performance. This technology provides a real-time analysis of the optimal ship performance parameters, such as speed and the configuration and utilization of various power sources, based on the current operational parameters of the ship and the current condition of the ship. Additionally, this technology provides real-time optimization information that may be utilized by stakeholders, such as the ship owner, ship manager, ship technical superintendent, original equipment manufacturer, service providers, port engineers, and other third parties to make better decisions regarding the ship's schedule, maintenance of ship equipment, and load planning for the ship.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0010]** FIG. **1** is an exemplary network environment comprising a performance optimization computing device;

**[0011]** FIG. **2** is an exemplary functional block diagram of the performance optimization computing device;

**[0012]** FIG. **3** is an exemplary functional block diagram of the modules within a memory of the performance optimization computing device; and

**[0013]** FIG. **4** is a flowchart of an example of a method of optimizing ship performance.

## DETAILED DESCRIPTION

**[0014]** An exemplary network environment **10** with a performance optimization computing device **12** for optimizing ship speed is illustrated in FIG. **1**. The exemplary network environment **10** includes the performance optimizing computing device **12**, a plurality of user devices **14(1)-14(*n*)**, and one or more ship operational systems **16(1)-16(*n*)** which are coupled together by the communication networks **30**, although the environment can include other types and numbers of devices, components, elements and communication networks in a variety of other topologies and deployments. While not shown, the exemplary environment **10** may include additional components, such as routers, switches and other devices which are well known to those of ordinary skill in the art and thus will not be described here. The exemplary network environment **10** may be contained within a ship, solely onshore, or spread across onboard and onshore locations. This technology provides a number of advantages including providing a more effective method, non-transitory computer readable medium, and device for optimizing ship performance.

**[0015]** Referring more specifically to FIG. **1**, performance optimization computing device **12** interacts with the plurality of user devices **14(1)-14(*n*)** and the one or more ship operational systems **16(1)-16(*n*)** through the communication networks **30**, although the performance optimization computing device **12** can interact with the plurality of user devices **14(1)-14(*n*)** and the one or more ship operational systems **16(1)-16(*n*)** using other methods or techniques. Communication networks **30** include local area networks (LAN), wide area network (WAN), 3G technologies, GPRS or EDGE technologies, although the communication networks **30** can include other types and numbers of networks and other network topologies. The communications take place over the communication networks according to standard network protocols, such as the Modbus, OPC, NMEA, HTTP, UDP, and/or TCP/IP protocols.

**[0016]** The performance optimization computing device **12** optimizes ship performance within a network environment **10** as illustrated and described with the examples herein, although performance optimization computing device **12** may perform other types and numbers of functions in other types of networks. As illustrated in FIG. **2**, the performance optimization computing device **12** includes at least one processor **18**, a memory **20**, an input device **22**, a display device **23**, and input/output (I/O) system **24** which are coupled together by bus **26**, although the performance optimization computing device **12** may comprise other types and numbers of elements in other configurations.

**[0017]** Processor(s) **18** may execute one or more computer-executable instructions stored in the memory **20** for the methods illustrated and described with reference to the examples herein, although the processor(s) can execute other types and numbers of instructions and perform other types and numbers of operations. The processor(s) **18** may comprise one or more central processing units ("CPUs") or general purpose processors with one or more processing cores, such as AMD® processor(s), although other types of processor(s) could be used (e.g., Intel®).

**[0018]** Memory **20** may comprise one or more tangible storage media, such as RAM, ROM, flash memory, CD-ROM, floppy disk, hard disk drive(s), solid state memory, DVD, or any other memory storage types or devices, including combinations thereof, which are known to those of ordinary skill in the art. Memory **20** may store one or more programmed instructions of this technology as illustrated and described with reference to the examples herein that may be executed by the one or more processor(s) **18**. By way of example only, the flow chart shown in FIG. **4** is representative of programmed steps or actions of this technology that may be embodied or expressed as one or more non-transitory computer or machine readable having stored instructions stored in memory **20** that may be executed by the processor(s) **18**, although other types and numbers of programmed instructions and/or other data may be stored. Memory **20** may also store data from the ship operational systems **16(1)-16(*n*)** (as shown in FIG. **1**), although the data could be stored in other locations on other devices.

**[0019]** Additionally as illustrated in FIG. **3**, the memory **20** includes a main engine data manager **300**, an auxiliary engine data manager **302**, a trip data module **304**, an efficiency manager **306**, a scheduler manager **308**, a heuristics manager **310**, a command manager **312** and a reporting module **314**, although the memory **20** may include other types and numbers of modules and/or other programmed instructions or other data.

**[0020]** The main engine data manager **300** receives input data in real time from one or more ship operational systems **16(1)-16(*n*)** associated with the main engines, although main engine data manager **300** may receive input data from other sources, such as user devices **14(1)-14(*n*)**. In particular, the input data is associated with the main engines operating to propel and/or maneuver or steer the ship. Such input data may include, by way of example only, engine fuel consumption data (from fuel flow meters), engine temperature, trim/draft and displacement data, engine power, shaft power/torque, although other data related to the one or more main engines may be input. Engine performance data such as lube oil pressures and temperatures, fuel oil pressures and temperatures, bearings data and/or other data associated with the efficiency and performance information of the main engine(s) may also be input.

**[0021]** The main engine data manager **300** may also receive input data associated with one or more boiler systems on the ship (if applicable) from one or more ship operational systems **16(1)-16(*n*)**, although main engine data manager **300** may receive input data from other sources, such as user devices **14(1)-14(*n*)**. The boiler system may be configured to consume fuel to power one or more turbines, auxiliary engines or other systems or services, although it is contemplated that the boiler system may be configured to efficiently utilize and convert excess energy such as heat to power turbines, auxiliary engines or other systems or services. For example, the boiler system may be utilized to produce steam for ship's services as well as fresh water on the ship.

**[0022]** The auxiliary engine data manager **302** receives data associated with the amount of fuel that one or more of the ship's auxiliary engines consume in order to meet electrical load demands while the ship is operating from one or more ship operational systems **16(1)-16(*n*)**, although auxiliary engine data manager **302** may receive input data from other sources, such as user devices **14(1)-14(*n*)**. In particular, the auxiliary engine data manager **302** receives input data associated with fuel consumed by the one or more auxiliary engines. Additionally, the auxiliary engine data manager **302** receives input data from one or more real time data sources, such as sensors, which represent the fuel consumed by the auxiliary engines in providing electrical power to the various systems and components which demand electrical power. Such systems and components which require electrical power include, but are not limited to, air compressors, lighting systems, air conditioning/heating systems, sewage and water pumps, plumbing systems, freezers, refrigeration systems, steering systems, anchor systems, electro hydraulic equipment, oil waste transfer systems, ballast tank pumps, communication systems, computer systems, navigation systems, and the like.

**[0023]** The trip data manager **304** receives data associated with factors which are not related to propulsion or electrical load information handled by the main and/or auxiliary engine (s) of the ship from one or more ship operational systems **16(1)-16(*n*)**, although trip data manager **304** may receive input data from other sources such as user devices **14(1)-14 (*n*)**. Such information may be manually entered, automatically retrieved from onboard computers (e.g. navigation/GPS systems, ship charting systems) or remote communication systems. Trip data includes, but is not limited to, draft/trim and displacement information, ship speed data, fuel cost data, wind state, air temperature, weather data, sea state (i.e., wave height, choppiness), navigation details, port information, distance information, head/tail wind data, geopolitical information (embargos, conflict zones), operational cost data (crew and supplies costs), charter revenue price rates, fuel density and specific gravity data, seawater and ambient air temperature and other relevant environmental factors, or trip information (distance, time of voyage).

**[0024]** The efficiency manager **306** is configured to analyze the amount of fuel consumed by differing combinations of (main and/or auxiliary) engines to meet load demand. For example, a ship may have a plurality of auxiliary engines, each of which are of differing ages, models, or load handling capacities, wherein the efficiency manager would determine that a certain combination of engines simultaneously operating to meet a certain electrical or propulsion demand would consume less fuel than another combination of engines. The efficiency manager **306** continually monitors input data provided by one or more of the data managers **300**, **302**, **304** and analyzes the data to effectively calculate varying fuel consumptions for those associated load demands for different combinations of engines and utilization rates for the engines. The efficiency manager **306** may also analyze and select fuel consumption scenarios for one or more main engines in addition or alternatively to auxiliary engines. The efficiency manager **306** is configured to continuously refresh the optimal main engine and auxiliary engine combinations. For example, this could be configured to 'look for' the best combination of Auxiliary Engine performance and fuel consumption over the past 90 (or other number of) days.

**[0025]** The heuristics manager **310** communicates with the efficiency manager **306** and stores as well as organizes historical data of the analyzed results provided by the efficiency manager **306**. This monitored information as well as the analyzed results are time stamped and provided to the heuristics manager **310**. In an example, the electrical load on a ship containing multiple refrigerated containers and four auxiliary engines or generators can be between 1,000 kilowatts or 3,500 kilowatts. In the event that the electrical load demand changes, either one, two, three or all four of those generators may be used to meet demand. The efficiency manager **306** may determine that not all of the four generators are the same as they may be different models, of differing handling capacities, of different material condition, of different age, of different current performance, or of different time from last overhaul, for example, which causes the generators to perform at different efficiencies from one another for a particular load demand. The efficiency manager **306** along with the heuristics manager **310** may determine, for a load demand of 2000 kilowatts, that the most fuel efficient combination are generators #1 and #3. In contrast, for an electrical load demand of 2200 kilowatts, the efficiency manager **306** along with the heuristics manager **310** may determine that operating generators #2 and #4 yields the highest fuel efficiency. The efficiency manager **306** may also utilize historical data handled by the heuristics manager **310** in making decisions on which combination of engines should be used for a particular load demand.

**[0026]** The scheduler manager **308** receives input data from the main engine data manager **300**, the auxiliary engine data manager **302**, the trip data manager **304** as well as the efficiency manager **306** and the heuristics manager **310** to determine the optimal speed that the ship should be cruising at while consuming the least amount of fuel to ensure that all electrical and power load demands are adequately met. The scheduler manager **308** may also be configured to determine the optimal speed the ship should be travelling at to optimize ship profit.

**[0027]** In particular, the scheduler manager optimizes between slowing down to save propulsion fuel with the excess time required to transit and the electrical load impact on fuel consumption during a longer/shorter voyage. The scheduler manager **308** takes into account real time data from the main engine data manager **300**, the auxiliary engine data manager **302** and the trip data manager **304** and calculates an optimal speed at which the ship should be operating at to achieve the most fuel efficient consumption rate while conforming to the established schedule on which the ship is to reach its destination. When optimizing for ship profit, the scheduler manager **308** will also balance the impact of speeding up and potentially achieving more revenue.

**[0028]** The command manager **312** allows instructions to be provided manually by display or electronically to another computer, such as the user device **14(1)**. The reporting manager **314** provides information, data, reports and other information to be displayed by to the user via a display screen such as on user device **14(1)**.

**[0029]** Referring again to FIG. **2**, the input device **22** enables a user, such as an administrator, to interact with the utility management computing device **14**, such as to input and/or view data and/or to configure, program and/or operate it by way of example only. By way of example only, input device **22** may include one or more of a touch screen, keyboard and/or a computer mouse.

**[0030]** The display device **23** enables a user, such as an administrator, to interact with the utility management computing device **14**, such as to view and/or input information and/or to configure, program and/or operate it by way of example only. By way of example only, the display device **23** may include one or more of a CRT, LED monitor, LCD monitor, or touch screen display technology although other types and numbers of display devices could be used.

**[0031]** The I/O system **24** in the performance optimization computing device **12** is used to operatively couple and communicate between the performance optimization computing device **12**, the user computing devices **14(1)-14(*n*)**, and the one or more ship operational systems **16(1)-16(*n*)**, which are all coupled together by communication network **30**. The I/O system engages in network communications over communication network **30** utilizing standard network protocols such as Modbus, OPC, NMEA, TCP/IP, HTTP, UDP, RADIUS, or

DNS, by way of example only. In this example, the bus **26** is a hyper-transport bus, although other bus types and links may be used, such as PCI.

**[0032]** Each of the plurality of user computing devices **14(1)-14(*n*)** includes a central processing unit (CPU) or processor, a memory, an input device, a display device, and an input/output (I/O) system, which are coupled together by a bus or other link, although other numbers and types of network devices could be used. The plurality of user devices **14(1)-14(*n*)** communicate with the performance optimization computing device **12** to allow a user to manually input information related to operational parameters for the ship, such as fuel cost, fuel type and density, fixed costs (e.g., crew costs, depreciation), or revenue rates, to the performance optimization computing device **12**. The plurality of user computing devices **14(1)-14(*n*)** may run interface application(s), such as a Web browser, that may provide an interface to input data and receive content and/or communicate with web applications stored on the performance optimization computing device **12** via the communication network **30**.

**[0033]** The network environment **10** also includes the one or more ship operational systems **16(1)-16(*n*)**. Each of the plurality of ship operational systems **16(1)-16(*n*)** includes a central processing unit (CPU) or processor, a memory, an interface device, and an I/O system, which are coupled together by a bus or other link, although other numbers and types of network devices could be used. The ship operational systems **16(1)-16(*n*)** are various measurement devices on the ship utilized to measure operational parameters related to the ship. The plurality of ship operational systems **16(1)-16(*n*)** communicate with the performance optimization computing device **12** through communication network **30**, although the ship operational systems **16(1)-16(*n*)** can interact with the performance optimization computing device **12** using other techniques. The ship operational systems **16(1)-16(*n*)** measure and communicate data associated with one or more ship operational parameters, such as electrical load required, draft/displacement, engine power, shaft power/torque, speed through water, generator performance, engine performance, engine fuel consumption, boiler fuel consumption, wind, current, sea state, generator combination and configuration, or environmental factors by way of example to the performance optimization computing device **12**.

**[0034]** Although an exemplary network environment **10** with the plurality of user computing devices **12(1)-12(*n*)**, performance optimization computing device **14** and plurality of ship operational systems **16(1)-16(*n*)** are described and illustrated herein, other types and numbers of systems, devices in other topologies can be used. It is to be understood that the systems of the examples described herein are for exemplary purposes, as many variations of the specific hardware and software used to implement the examples are possible, as will be appreciated by those skilled in the relevant art(s). By way of example, the systems of the present technology can be contained within a ship, solely be onshore, or spread across onboard the vessel and onshore locations.

**[0035]** Furthermore, each of the systems of the examples may be conveniently implemented using one or more general purpose computer systems, microprocessors, digital signal processors, and micro-controllers, programmed according to the teachings of the examples, as described and illustrated herein, and as will be appreciated by those of ordinary skill in the art.

**[0036]** The examples may also be embodied as a non-transitory computer readable medium having instructions stored thereon for one or more aspects of the present technology as described and illustrated by way of the examples herein, as described herein, which when executed by a processor, cause the processor to carry out the steps necessary to implement the methods of the examples, as described and illustrated herein.

**[0037]** An example of a method for optimizing ship performance will now be described with reference to FIGS. **1-4**. Referring more specifically to FIG. **4**, an example of the method is described with respect to optimizing the speed of the ship, although other operational parameters related to the performance of the ship, such as by way of example only engine utilization, may be optimized using the exemplary method.

**[0038]** In step **400**, the performance optimization computing device **12** obtains data associated with one or more operational parameters. The performance optimization computing device **12** receives one or more operational parameters in real-time from the ship operational systems **16(1)-16(2)**, which may include the electrical load necessary to operate the onboard equipment, draft/displacement of the ship, engine power, shaft power/torque, speed through water, generator performance, engine performance, environmental conditions such as wind, current, or sea state, or generator combination/configuration, although other operational parameters may be received from the one or more ship operational systems **16(1)-16(*n*)**. The performance optimization computing device **12** may also obtain data associated with operational parameters, such as fuel cost, fuel type, trip information, costs, or revenue, from the one or more user devices **14(1)-14(2)**, althought the performance optimization computing device **12** may obtain other types of data associated with operational parameters from other sources.

**[0039]** In step **410**, the performance optimization computing device **12** identifies one or more performance values, such as by way of example fuel consumption, corresponding to the obtained data, although other performance values may be utilized. Although other performance values may be utilized, the method will be described in relation to fuel consumption. The fuel consumption value indicate the performance of the ship based on the current operational parameters, that is a lower fuel consumption value indicates more efficient operation of the ship at the current operational parameters.

**[0040]** In step **415**, the performance optimization computing device **12** stores the obtained data from the ship operational systems **16(1)-16(*n*)** along with the fuel consumption value in memory **20**, althought the obtained data may be stored in other locations or on other devices, such as an external storage system (i.e., in a third party data historian system). In one example, the stored data and fuel consumption value may be time-stamped. The obtained data may be stored over a period of time such as a month, a year, a season, or a particular voyage time. The data is continuously updated over the period of time in order to provide an accurate assessment of the current condition of the ship. The operation data may be stored in a table which correlates the operational parameters, such as electrical load and displacement, with the fuel consumption data.

**[0041]** Next, in step **420** the performance optimization computing device **12** compares the current obtained data and associated fuel consumption values with historical data stored in the memory **20**. The obtained data is compared against the data stored for the relevant time period. The data is compared to identify different fuel consumption values for the same operational parameters at different rates of speed for the ship, although other comparisons of other types and numbers of values may be utilized. By way of example, the performance optimization computing device **12** may determine whether the is a more efficient value for fuel consumption in the stored table based on the obtained data. The table may be updated if the current operational parameters yield a more efficient value.

**[0042]** In step **425**, the performance optimization computing device **12** determines, based on the comparison in step **420**, an optimal speed for the ship at the current operational parameters, although the performance optimization device **12** may determine optimal values for other parameters such as engine configuration or utilization among several engines. The performance optimization computing device **12** determines if the ship is currently travelling at the optimal speed In one example, the optimal speed for the ship is determined using a regression analysis, although other methods may be utilized to determine the optimal speed. By way of example, the performance optimization computing device **12** correlates speed of the ship to the operational parameters to determine the speed at which the ship has the most efficient fuel consumption value.

**[0043]** Next, in step **430**, the performance optimization computing device **12** provides the optimal speed. By way of example, the optimal speed may be displayed on one or more of the user devices **14(1)**-**14(***n***)**, although the optimal speed may be displayed on other devices in other locations. The optimal speed for the ship may be continuously updated based on changes in operational parameters for the ship. By way of example, an increase in temperature may require an increased electrical load to operate refrigeration equipment on the ship. The increased electrical load will impact the optimal speed at which the ship should travel to minimize fuel consumption over the course of the ship's voyage.

**[0044]** In step **435**, the performance optimization computing device **12** compares the optimal speed provided in step **430** with a current speed or a ship schedule maintenance speed, although the optimal speed may be compared with other values. By way of example, the ship schedule maintenance speed is the speed that the ship must travel at to complete its voyage in the scheduled amount of time allotted for the voyage. The performance computing device **12** may indicate the difference between the optimal speed and the required schedule maintenance speed to provide information to ship operators that may be utilized to revise scheduling practices.

**[0045]** In step **440**, the performance optimization computing device **12** determines a potential cost savings based on travelling at the optimal speed based on the comparison in step **435**. The performance optimization computing device **12** determines the potential cost savings based on the obtained data, which may include trip information, costs information, and revenue information.

**[0046]** In step **445**, the performance optimization computing device **12** provides the potential cost savings. By way of example, the potential cost savings may be displayed on one or more of the user devices **14(1)**-**14(***n***)**, although the potential cost savings may be displayed on other devices in other locations. The potential cost savings may be utilized to monitor and modify shipping practices for the ship.

**[0047]** This technology provides a number of advantages including providing more effective methods, devices, and non-transitory computer readable media for optimizing ship performance. The present technology provides a real-time analysis of the optimal ship performance parameters, such as speed and the configuration and utilization of various power sources, based on the current operational parameters of the ship and the current condition of the ship.

**[0048]** Having thus described the basic concept of the invention, it will be rather apparent to those skilled in the art that the foregoing detailed disclosure is intended to be presented by way of example only, and is not limiting. Various alterations, improvements, and modifications will occur and are intended to those skilled in the art, though not expressly stated herein. These alterations, improvements, and modifications are intended to be suggested hereby, and are within the spirit and scope of the invention. Additionally, the recited order of processing elements or sequences, or the use of numbers, letters, or other designations therefore, is not intended to limit the claimed processes to any order except as may be specified in the claims. Accordingly, the invention is limited only by the following claims and equivalents thereto.

What is claimed is:

**1**. A method for optimizing performance of a ship, the method comprising:

obtaining, by a performance optimization computing device, data associated with one or more operational parameters associated with the ship;

identifying, by the performance optimization computing device, one or more performance values corresponding to the obtained data;

determining, by the performance optimization computing device, one or more optimal operational parameters based on a comparison of the identified one or more performance values and one or more historical performance values, wherein the historical performance values correspond to historical data associated with the one or more operational parameters;

providing, by the performance optimization computing device, the determined one or more optimal operational parameters for the ship.

**2**. The method of claim **1** wherein the one or more operational parameters comprise one of more of an engine performance value, an electrical load value, or one or more environmental factor values.

**3**. The method of claim **1** wherein the one or more performance values comprises a fuel consumption value.

**4**. The method of claim **1** wherein the determined optimal operational parameter comprises a ship speed value.

**5**. The method of claim **4** further comprising

comparing, by the performance optimization computing device, the determined optimal ship speed to at least one of a current ship speed or a schedule maintenance ship speed; and

determining, by the performance optimization computing device, a potential cost savings based on the comparison.

**6**. The method of claim **4** wherein the optimal ship speed value comprises a ship speed value that minimizes fuel consumption for the ship at the one or more operational parameters.

**7**. The method of claim **4** wherein the optimal ship speed value comprises a ship speed value that maximizes profitability of the ship.

**8**. The method of claim **1** wherein the one or more performance values comprises an engine configuration and utilization value.

**9**. A performance optimization computing device comprises:

a memory coupled to one or more processors which are configured to execute programmed instructions stored in the memory comprising:

obtaining data associated with one or more operational parameters associated with the ship;

identifying one or more performance values corresponding to the obtained data;

determining one or more optimal operational parameters based on a comparison of the identified one or more performance values and one or more historical performance values, wherein the historical performance values correspond to historical data associated with the one or more operational parameters;

providing the determined one or more optimal operational parameters for the ship.

**10**. The device of claim **9** wherein the one or more operational parameters comprise one of more of an engine performance value, an electrical load value, or one or more environmental factor values.

**11**. The device of claim **9** wherein the one or more performance values comprises a fuel consumption value.

**12**. The device of claim **9** wherein the determined optimal operational parameter comprises a ship speed value.

**13**. The device of claim **12** wherein the one or more processors are further configured to execute programmed instructions stored in the memory comprising:

comparing the determined optimal ship speed to at least one of a current ship speed or a schedule maintenance ship speed; and

determining a potential cost savings based on the comparison.

**14**. The device of claim **12** wherein the optimal ship speed value comprises a ship speed value that minimizes fuel consumption for the ship at the one or more operational parameters.

**15**. The device of claim **12** wherein the optimal ship speed value comprises a ship speed value that maximizes profitability of the ship.

**16**. The device of claim **9** wherein the one or more performance values comprises an engine configuration and utilization value.

**17**. A non-transitory computer readable medium having stored thereon instructions for optimizing ship performance comprising machine executable code which when executed by at least one processor causes the processor to perform steps comprising:

obtaining data associated with one or more operational parameters associated with the ship;

identifying one or more performance values corresponding to the obtained data;

determining one or more optimal operational parameters based on a comparison of the identified one or more performance values and one or more historical performance values, wherein the historical performance values correspond to historical data associated with the one or more operational parameters;

providing the determined one or more optimal operational parameters for the ship.

**18**. The medium of claim **17** wherein the one or more operational parameters comprise one of more of an engine performance value, an electrical load value, or one or more environmental factor values.

**19**. The medium of claim **17** wherein the one or more performance values comprises a fuel consumption value.

**20**. The medium of claim **17** wherein the determined optimal operational parameter comprises a ship speed value.

**21**. The medium of claim **20** further having stored thereon instructions comprising machine executable code which when executed by at least one processor causes the processor to perform steps comprising:

comparing the determined optimal ship speed to at least one of a current ship speed or a schedule maintenance ship speed; and

determining a potential cost savings based on the comparison.

**22**. The medium of claim **20** wherein the optimal ship speed value comprises a ship speed value that minimizes fuel consumption for the ship at the one or more operational parameters.

**23**. The medium of claim **20** wherein the optimal ship speed value comprises a ship speed value that maximizes profitability of the ship.

**24**. The medium of claim **17** wherein the one or more performance values comprises an engine configuration and utilization value.

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