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TITLE OF THE INVENTION

CONSTRUCTION MANAGEMENT SYSTEM AND CONSTRUCTION MANAGEMENT METHOD

BACKGROUND OF THE INVENTION

The present invention relates to a construction management system for managing construction or general construction work, such as civil engineering work or the like, and more particularly to a construction management system using a computer.

Conventionally, it is a general procedure to plan and manage construction by handwritten documents. For instance, the progress of a daily tasks is written in a daily report, and quantities, e.g., a volume of tasks completed or a quantity of resources supplied, are obtained by tabulating a predetermined period of daily reports.

However, in the conventional technique, the tabulation of daily reports is cumbersome and it is difficult to ascertain the daily volume of tasks completed, cumulative resources supplied, cost, and so forth.

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SUMMARY OF THE INVENTION

The present invention is made in consideration of the above situation, and has as its object to provide a construction management system which can easily ascertain the progress of construction.

In order to solve the above-described problems and attain the object, the present invention provides a computer readable medium storing a construction management program for managing progress of a task related to construction, the construction management program comprising: an acquisition program for acquiring a planned schedule, a planned volume, and an achieved volume related to the task; a portion-of-task-completed calculation program for calculating a completed portion of the task based on the planned volume and the achieved volume acquired by the acquisition program; and a display program for displaying on a computer screen, a bar chart having a position and length on a time axis corresponding to the planned schedule, and the bar chart itself showing the completed portion of the task.

Furthermore, the present invention provides a computer readable program storing a construction management program for managing progress of a task related to construction, the construction management program comprising: an acquisition program for

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acquiring a name of the construction, a name of a work item included in the construction, a name of a task included in the work item, and planned schedules for the construction, the work item, and the task, and a display program for hierarchically displaying on a computer screen, the name of the construction, the name of the work item, and the name of the task acquired by the acquisition program, displaying a bar chart, indicative of the planned schedule for the construction, at a position corresponding to the name of the construction displayed hierarchically, displaying a bar chart, indicative of the planned schedule for the work item, at a position corresponding to the name of the work item displayed hierarchically, and displaying a bar chart, indicative of the planned schedule for the task, at a position corresponding to the name of the task displayed hierarchically, the bar chart having a position and length on a time axis corresponding to the planned schedule for the task, and the bar chart itself showing the completed portion of the task.

Furthermore, the present invention provides a computer readable medium storing a construction management program for managing progress of a task related to construction, the construction management program comprising: an acquisition program for acquiring a planned schedule for the task and storing

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the planned schedule in storage means; a display program for displaying a bar chart having a position and length on a time axis corresponding to the planned schedule acquired by the acquisition program; a bar chart change command acquisition program for acquiring a bar chart change command which changes a position and/or length of the bar chart displayed by the display program; and a planned schedule update program for updating the planned schedule stored in the storage means in accordance with the bar chart change command acquired by the bar chart change command acquisition program.

Furthermore the present invention provides a computer readable medium storing a construction management program for managing progress of a plurality of tasks related to construction, the construction management program comprising: an acquisition program for acquiring a planned schedule for the plurality of tasks and task link data indicative of sequential relations between the plurality of tasks, and storing the planned schedule and the task link data in storage means; and a display program for displaying on a computer screen, a network diagram showing a plurality of nodes respectively having positions on a time axis corresponding to the planned schedule of the plurality of tasks, and an arrow connecting the plurality of

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nodes in accordance with the task link data.

Furthermore, the present invention provides a construction management system for managing progress of a task related to construction, comprising: storage means for storing a planned schedule and a planned volume related to the task; input means for inputting an achieved volume related to the task; portion-of-task-completed calculation means for calculating a completed portion of the task based on the planned volume stored in the storage means and the achieved volume inputted by the input means; and display means for displaying a bar chart, a position and length of the bar chart on a time axis representing the planned schedule, and the bar chart itself showing the completed portion of the task.

Furthermore, the present invention provides a construction management system for managing progress of a task related to construction, comprising: storage means for storing a name of the construction, a name of a work item included in the construction, a name of a task included in the work item, and planned schedules for the construction, the work item, and the task; and display means for displaying in association with each other, a schedule table which hierarchically shows the name of the construction, the name of the work item, and the name of the task stored in the storage means, a

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bar chart showing the planned schedule for the construction, a bar chart showing the planned schedule for the work item, and a bar chart showing the planned schedule for the task.

Furthermore, the present invention provides a construction management system for managing progress of a task related to construction, comprising: storage means for storing a planned schedule for the task; display means for displaying a bar chart having a position and length on a time axis corresponding to the planned schedule stored in the storage means; bar chart change means for changing the position and/or length of the bar chart displayed by the display means; and planned schedule update means for updating the planned schedule stored in the storage means in accordance with a change in the bar chart made by the bar chart change means.

Furthermore, the present invention provides a construction management method of managing progress of a task related to construction by a computer, comprising the steps of: an acquisition step of acquiring a planned schedule, a planned volume, and an achieved volume related to the task; a portion-of-task-completed calculation step of calculating a completed portion of the task based on the planned volume and the achieved volume acquired in the acquisition step; and a

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display step of displaying a bar chart on a computer screen, a position and length of the bar chart on a time axis representing the planned schedule, and the bar chart itself showing the completed portion of the task.

Furthermore, the present invention provides a construction management method of managing progress of a task related to construction by a computer, comprising the steps of: an acquisition step of acquiring a name of the construction, a name of a work item included in the construction, a name of a task included in the work item, and planned schedules for the construction, the work item, and the task; and a display step of displaying in association with each other on a computer screen, a schedule table which hierarchically shows the name of the construction, the name of the work item, and the name of the task acquired in the acquisition step, a bar chart showing the planned schedule for the construction, a bar chart showing the planned schedule for the work item, and a bar chart showing the planned schedule for the task.

Furthermore, the present invention provides a construction management method of managing progress of a task related to construction by a computer having storage means, comprising the steps of: a storing step of acquiring a planned schedule for the task and

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storing the planned schedule in the storage means; a display step of displaying a bar chart having a position and length on a time axis corresponding to the planned schedule acquired in the storing step; a bar chart change command acquisition step of acquiring a bar chart change command which changes the position and/or length of the bar chart displayed in the display step; and a planned schedule update step of updating the planned schedule stored in the storage means in accordance with a change in the bar chart made in the bar chart change command acquisition step.

Other features and advantages of the present invention will be apparent from the following description taken in conjunction with the accompanying drawings, in which like reference characters designate the same or similar parts throughout the figures thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are incorporated in and constitute a part of the specification, illustrate embodiments of the invention, and together with the description, serve to explain the principles of the invention.

Fig. 1 is a block diagram showing a brief flow of processes when employing a construction management

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system according to the present invention;

Fig. 2 is a diagram showing an outline of a process when using the construction management system in a planning stage, construction being in progress, and report generation;

Fig. 3 is a block diagram showing a hardware structure which realizes the construction management system according to the present invention;

Fig. 4 is a flowchart showing a process flow for utilizing the construction management system according to the present invention in the stage of construction planning;

Fig. 5 is a view showing an example of a displayed screen for inputting plan data related to a work item (itemized work);

Fig. 6 is a view showing an example of a displayed screen at the time of inputting plan data related to a task;

Fig. 7 is a view showing an example of a displayed screen at the time of editing a resource list 67;

Fig. 8 is a flowchart showing a process performed in a subroutine for the displaying step in Fig. 4;

Fig. 9 is a view showing an example of a displayed bar chart for a work item schedule and a task schedule;

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Fig. 10 is a view showing an example of a bar chart display screen for a resource supply schedule for each resource;

Fig. 11 is a table showing an example of the planned statement of items;

Fig. 12 is a view showing an example of a dialogue displayed when a command for outputting an implementation budget document is sent;

Fig. 13 is a view of an example of an implementation budget document;

Fig. 14 is a flowchart showing a process performed by using the present system, after construction work is completed;

Fig. 15 is a view showing an example of a dialogue displayed on a screen in a case where daily report input is commanded;

Fig. 16 is a view showing an example of a time chart for each task;

Fig. 17 is a view showing an example of a displayed bar chart during construction being in progress;

Fig. 18 is a flowchart showing the process performed in a subroutine for outputting a table;

Fig. 19 is a view showing an example of a daily report output;

Fig. 20 is a view showing an example of the work-

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itemized resource quantity table;

Fig. 21 is a view showing an example of an outputted monthly resource supply table;

Fig. 22 is a view showing an example of a link setting screen;

Fig. 23 is a view showing an example of a network diagram display screen;

Fig. 24 is a network diagram extracted from Fig. 23;

Fig. 25 is a view showing an example of a stacking view display dialogue screen;

Fig. 26 is a view showing an example of a stacking view;

Fig. 27 is a view showing an example of a correction dialogue using leveling method;

Fig. 28 is a view showing an example of a leveling view;

Fig. 29 is a view showing an example of a network diagram which reflects leveling operation;

Fig. 30 is a view showing an example of a task list represented by the stacking view or the leveling view.

Fig. 31 is a flowchart showing the correction process using leveling method; and

Fig. 32 is an explanatory view showing detailed contents of the plan data 14c in Fig. 3.

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DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Preferred embodiments of the present invention will be described in detail in accordance with the accompanying drawings. Note that the relative positioning, process orders, displayed windows or the like disclosed in the present embodiment do not limit the scope of the present invention unless stated specifically.

The resource used in the present invention is not limited to, e.g., manpower resources such as general workers or special workers or the like, but also includes material resources such as machines or equipment used for construction work.

<First Embodiment>

A first embodiment of the construction management system according to the present invention is described with reference to Figs. 1 to 10. The present embodiment realizes the construction management system by executing a predetermined program on a computer. The present embodiment enables easy assertion of the progress of construction by inputting a task schedule of a construction project contracted, a daily volume of tasks completed, and a quantity of resources supplied. Particularly, since the type of work, resources and cost are stored in association with each other, construction management can be efficiently performed.

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[Background in Applying Construction Management System]

Fig. 1 is a block diagram showing a brief flow of processes when employing the construction management system according to the present invention.

For instance, in a case where a construction company receives an order for public works from the Ministry of Construction or the like, a construction plan specifying the location and details of construction is given at a meeting explaining the construction site (S1). With respect to specific work items, a reference table issued by the Ministry of Construction specifies necessary tasks for a particular work item, necessary resources for each task (including materials, manpower, and depreciation), and cost required for supplying each resource. Therefore, the minimum cost required for the entire construction plan is roughly calculated based on the reference table.

Next, after being appointed and registered as a contractor by the Ministry of Construction, the construction company makes an original construction plan (S2), while considering in what orders the tasks should be implemented, how the resources should be used efficiently, and as a result, how the cost can be reduced. Then, a required cost for the original plan is estimated. The estimated amount is used for bidding.

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If successfully bid, the order is received and a contract amount is decided (S3).

When the order is received, a more detailed construction plan is generated (S4), and the construction starts (S5) while improving the construction plan. After the start of construction, the daily volume of tasks completed and a quantity of resources supplied are recorded on a daily report as the construction progresses. As a matter of course, some constructions do not necessarily progress as planned. In many cases, the plan must be changed during the construction in progress.

When the construction is completed (S6), the result is reported from the construction site to the managing division of the company (S7). The amount of resources ultimately consumed, the cost spent, and profit and loss over the contract amount are calculated from the daily report, compiled in the form of a final report and submitted.

The construction management system according to the present embodiment supports the contractor at all stages, from the stage of receiving a construction plan to the stage of submitting a construction completion report. In other words, the present embodiment is a system for integrally and conveniently planning a construction work, executing construction management of

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a construction site, and generating a report without inconsistency.

[Outline of Construction Management System]

Next, the construction and operation of the present system is described with reference to Figs. 2 and 3. Fig. 2 shows an outline of the process when using the construction management system in the stage of planning, construction in progress, and report generation. Fig. 3 is a block diagram showing a hardware structure which can realize the construction management system. As shown in Fig. 3, predetermined data is stored in a personal computer having a predetermined hardware structure, and by having the personal computer execute the program, the personal computer can be used as a construction management apparatus.

Referring to Fig. 3, reference numeral 11 denotes a CPU which executes operation or control for controlling the entire apparatus; and 12, a ROM storing programs executed by the CPU 11 and fixed values. Reference numeral 13 denotes a RAM as a temporary storage, which includes a program load area 13a for temporarily storing a loaded program. Reference numeral 14 denotes hard disc (hereinafter referred to as HD) storing an operation system (OS) 14a, various

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data such as record data 14b, plan data 14c, and display data 14d, which will be described later.

Reference numeral 15 denotes a VRAM where bit map data is temporarily stored at the time of displaying in a cathode ray tube (CRT) or the like. Reference numeral 16 denotes a CD-ROM drive. The CD-ROM drive 16 shows the state in which a CD-ROM 17 is set. The CD-ROM 17 also constitutes a part of the present system. In the CD-ROM 17, a construction management program 17a and database (hereinafter referred to as DB) such as work item master database 17b, resource master database 17c and the like are stored in advance. The programs and database may be used after being installed from the CD-ROM 17 to the HD 14.

The construction management program 17a includes a plan data generation module 17aa, a record data input module 17ab, a display module 17ac, and an output module 17ad.

Reference numeral 18 denotes an input/output interface (I/O) for inputting/outputting image data from/to an external apparatus. Through the I/O 18, data is exchanged between an input apparatus e.g., a keyboard, 19, mouse 20 and the like, and an output apparatus e.g., a CRT 21, a printer 22 or the like. Moreover, data can be exchanged with an external apparatus through a communication unit 23. Note that

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other storage devices may be used instead of the HD 14. Other storage devices (including HD) may be used instead of the CD-ROM 17. Furthermore, it goes without saying that a liquid crystal display device may be used instead of the CRT 21.

By commanding execution of the plan data generation module 17aa of the construction management program 17a by using the input apparatuses 19 and 20, the program codes of the module are sent to the program load area 13a of the RAM 13 from the CD-ROM 17 and executed by the CPU 11. To generate plan data, tasks and resources necessary for the construction are selected from a work item master DB 17b and a resource master DB 17c stored in the CD-ROM 17 and registered (steps 2a to 2c), then further schedule data for carrying out the task is inputted (step 3).

The work item master DB 17b and resource master DB 17c correspond to the reference table described with reference to Fig. 1, which is available to the public through the Ministry of Construction or an auxiliary organization of a local government. The work item master DB 17b has a tree structure where various construction data are classified into a number of large construction item categories, then each large construction item category is classified into medium construction item categories, and each medium

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construction item category is further classified into small construction item categories. Construction data is finely classified until the data finally reaches a task category level. Resources necessary and cost required to use a predetermined unit of a resource are stored in association with the task categories.

Meanwhile, the resource master DB 17c comprises a list of various resources which are classified and stored in a tree structure by the order of work items, tasks, and resources. The resource master DB also specifies the cost for using a predetermined unit of each resource. In the resource master DB 17c, all resources possibly used in construction work are stored in correspondence with each task.

The work item master DB 17b is categorized into large categories such as earth work, foundation work and so forth. Further, the earth work category includes medium categories such as mechanical earth work, manual earth work and so on. Furthermore, the mechanical earth work category includes small categories such as excavation and dozing by bulldozers and the like. Still further, the small category includes plural types of tasks corresponding to the distance, nature of sand and the like. For instance, the small category, excavation and dozing by bulldozers, includes a plurality of tasks corresponding to the type

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of bulldozer. With regard to each of the plurality of tasks, necessary resources are also determined. For instance, according to the type of bulldozer and the volume of task set initially, how many hours a special driver must drive, how many liters of gas oil is necessary, and how much hire the bulldozer requires are determined. To change the resources stored in association with tasks in the work item master DB 17b, data is registered in the resource master DB 17c. The quantity per unit of the resources may also be changed.

The registered work item data, task data, resource data and inputted schedule data are stored in the HD 14 as plan data 14c. As shown in Fig. 3, work item data in the plan data 14c also has a tree structure. Work item data and task data are stored in correspondence with the inputted schedule data, and each task data is stored with a pointer for necessary resource data.

Detailed configuration of the plan data 14c is shown in Fig. 32. As shown in Fig. 32, the plan data 14c includes a construction table 321, large category work item table 322, small category work item table 323, task table 324, and resource table 325. As a matter of course, plural tables may be included as a medium category work item table.

Since the construction table, several work item

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tables, task table, and resource table are connected to one another by respective pointers, thereby forming a tree structure, an operator can easily recognize work items included in the construction, tasks included in the work item, or resources necessary for the task. By connecting in association with each other, the aforementioned tables with a cost-per-unit table which stores resources and cost per unit, it is possible to easily calculate the entire cost for the construction project I.

Furthermore, to calculate a volume of task completed for a predetermined task, a planned volume and achieved volume of the task is read out of the aforementioned task table, and the achieved volume is divided by the planned volume by a CPU. The task table 324 in Fig. 32 may include a field for registering the obtained volume of task completed. In the similar manner, the ratio of supplied resource quantity can be calculated by dividing the supplied quantity by the planned quantity in the CPU.

By executing the record data input module 17ab in the construction management program 17a, it is possible to perform record data input (5 in Fig. 2) in the form of a daily report for each task of the plan data. Herein, the record data mainly refers to the volume of tasks completed and quantity of resources supplied.

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Record data also includes daily weather, time schedule, and other comments. The record data 14b includes, as shown in Fig. 3, daily report data, monthly report data which is an accumulation of the daily report data, and cumulative data which is an accumulation of all data.

By executing the display module 17ac in the construction management program 17a, a task schedule and progress are displayed on the CRT 21 in the form of a bar chart, based on the plan data 14c and record data 14b. This process will be described later in detail.

By executing the output module 17ad in the construction management program 17a, it is possible to perform generation of an implementation budget document (6 in Fig. 2) and table generation (7 in Fig. 2) based on the plan data 14c and record data 14b stored in the HD 14. A generated implementation budget document 9 is displayed on the CRT 21, then may be printed by the printer 22 or transmitted externally through the communication unit 23.

[Operation of Construction Management System]

Next, the operation, displaying, and print-our operation of the present system will be described with reference to Figs. 4 to 21.

1. Construction Planning Stage

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Fig. 4 is a flowchart showing the process for utilizing the present system in the stage of construction planning.

First, as an outline of a construction, the location of the construction, starting date and completion date of the construction, and a contract amount are inputted. Further, the monthly labor days, standard daily labor hours, and an overtime premium coefficient of labor time are inputted and holidays are specified. Then, plan data is inputted for each work item and task as described above (S41). If correction is necessary, data is corrected as necessary (S42). Fig. 5 shows an example of a displayed screen for inputting plan data related to a work item (itemized work). In the field 51, a name of the work item, which can be planned and inputted on this screen, is inputted. This example shows that plan data is inputted for a case where a location consisting of sand or sandy soil on a normal ground is excavated and dozed by a bulldozer for 20 meters. In the field 52, a schedule for the work item is inputted. In the field 53, a planned work volume (herein, the unit is m^3) is inputted. As the construction work progresses, the implementation date is displayed in the field 54; the achieved work volume is displayed in the field 55; and the percentage of work completed is displayed in the

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field 56.

Fig. 6 shows an example of a displayed screen for inputting plan data related to a task. The screen has a similar structure to that of Fig. 5. The name of a task is displayed in the field 61; a schedule for the task is displayed in the field 62; and a planned task volume is displayed in the field 63. Although the planned task volume is generally determined in advance according to the planned volume of the work item, it can be flexibly changed in accordance with the condition in the construction site. As the construction work progresses, the implementation date is displayed in the field 64; the achieved task volume is displayed in the field 65; and the percentage of tasks completed is displayed in the field 66.

Differing from the above-described work item plan data input screen, the task plan data input screen has a resource supply plan data input section (bottom half in Fig. 6). In the field 67, a list of resources is displayed. In the field 68, a planned quantity for the resource selected from the list (shown in reversed letters) is displayed, and a standard resource supply quantity per day (daily resource supply quantity) is displayed in the field 69. Although these quantities are determined according to the planned volume of the work item in the upper hierarchy, they can be flexibly

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changed.

In a case of using resources other than that listed in the resource list 67 for the task, a resource addition button 70 is clicked. Then, a dialogue shown in Fig. 7 is displayed. From a category display section 71, a category of resources (e.g., manpower, hire, expendable materials and so on) is selected. Then, resources which belong to the selected category are read from the resource master DB and displayed as a list 72 (Fig. 7) for the task on which plan data is inputted in Fig. 6.

Fig. 7 shows an example of a displayed screen in a case where an expendable material besides manpower, hire, rental and the like, is selected as a resource category, the selected resource list 72 is displayed, and ready mixed concrete is selected from the resource list 72 as shown in the selected resource field 73. With regard to the selected resource (herein, ready mixed concrete), cost is displayed in the field 74, an availability factor is displayed in the field 75, and the unit and a classification of the unit are also displayed. These can be changed. If a resource addition button 76 is clicked in this state, the selected resource (ready mixed concrete) is added to the resource list 67 in Fig. 6. New resources may be added to the resource list 72, or existing resources in

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the list may be changed or deleted.

Plan data is inputted in the above-described manner. The inputted plan data can be displayed in a bar chart (S43 in Fig. 4). Fig. 8 is a flowchart showing the process performed in a subroutine for displaying the bar chart. It is determined whether or not a bar chart display command is received (S81), and if a display command is received, plan data 14c is read from the HD 14 (or from the RAM 13 if plan data is not yet stored in HD) (S82). The read plan data 14c is converted to display data and stored in the HD 14 as display data 14d, together with a display format which has been read from a CD-ROM in advance. Next, the display data 14d is developed (S83) and stored in the VRAM 15 (S84). The image data stored temporarily in the VRAM 15 is sent to the CRT 21 through the I/O 18 and displayed (S85).

Fig. 9 shows a displayed example of a bar chart. A planned schedule of the work item is indicated by a gray graph 91 (horizontal dashed line), and a planned schedule of the task is indicated by a blue graph 92 (horizontal line). The bar length and the horizontal position of the bar graph are shown in correspondence with the dates 93. The vertical positions of the bar graphs in the right field 94 respectively correspond to work items and tasks in the schedule list having a tree

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structure in the left field 95. More specifically, the bar graph 91 on the top of the chart indicates that the construction is scheduled during March 30 and May 1.

As the construction work progresses, the bar graph representing the work schedule is changed from blue to red, indicating the ratio of tasks completed. Therefore, if all graphs are shown in blue, it indicates that construction work has not started.

Furthermore, the bar graph may be extended or moved in the chart by pointing the bar graph with a mouse and performing drag and drop operation. In parallel with such operation on the bar chart, values in the schedule input fields 52 and 62 in Figs. 5 and 6 also change. In other words, by operating the bar graph on the chart, work items and task schedules may be planned efficiently.

Furthermore, bar charts may be displayed for each resource. Fig. 10 shows an example of a displayed bar chart for each resource.

Similar to Fig. 9, the gray graph 101 (horizontal dashed line) indicates a resource supply schedule for each resource category, and the blue graph 102 (horizontal line) indicates a resource supply schedule for each resource necessary for the task. The bar length and the horizontal position of the bar graph are shown in correspondence with the dates 103. The

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vertical positions of the bar graphs in the right field 104 respectively correspond to the resource categories and resources necessary for each task in the resource supply schedule list having a tree structure in the left field 105. Similar to Fig. 9, the bar chart enables easy task scheduling in order to efficiently utilize the resources, in a case where the same type of resources are used for different tasks. For instance, it is possible to easily schedule such that no more than three special drivers are necessary, by adjusting the overlaps of the bar graphs. Note that it is possible to generate a chart having dates in the horizontal axis and the quantity of supplied resources in the vertical axis, to show the variance of the supplied quantity of each resource. In this case, the chart may be a vertical bar chart or a line chart.

Referring back to Fig. 4, while the bar chart of a plan is being displayed (S43), the plan is adjusted as necessary. When the plan is fixed, a user selects (S44) whether or not a planned statement of items is to be outputted. If output is selected, a command for generating a planned statement of items is sent (S45). The planned statement of items is a summary of data for each work item and each task, obtained in the planning stage. Fig. 11 shows an example of the planned statement of items. Work items and respective volumes,

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costs, schedule, resources, respective quantities and costs are shown in a table.

Referring back to Fig. 4, selection is made as to whether or not an implementation budget document is to be submitted (S46). An implementation budget document is submitted for the purpose of reporting the amount of profit calculated by comparing the contract amount with the actual cost required for the construction. Fig. 12 shows a dialogue displayed when a command for outputting an implementation budget document is sent in step S46. In the field 121, the date of generating the implementation budget document is inputted. Then, the current status in which the budget document is generated is selected from the selection buttons 122. More specifically, before receiving orders, "preliminary plan" button is selected. After receiving orders and before starting the construction, "initial plan" button is selected. In a case where the plan is changed after starting the construction, "change of plan" button is selected, and the number of times changed is inputted. After the construction is completed, the final amount of profit is calculated and reported in the implementation budget document. In this case, "settlement" button is selected.

Fig. 13 shows an outputted implementation budget document. The "initial plan 1" column 131 and the

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"initial plan 2" column 132 are provided to ascertain the changes in various costs and profits caused by a change of plan. The amount difference is shown in the column "2-1".

The above-described planned statement of items does not have to be outputted in the order of the flowchart in Fig. 4, but may be outputted at an arbitrary timing.

2. After Construction

Fig. 14 is a flowchart showing the process performed by using the present system, after construction work is completed.

After starting the construction, record data is inputted in a daily report (S141) to manage the progress of the construction. The daily report may be inputted externally through the communication unit 23. Fig. 15 shows a dialogue displayed on a screen in a case where daily report input is commanded. In Fig. 15, reference numeral 151 denotes a date input field where the date corresponding to the contents of the daily report is shown. The date can be flexibly changed. In accordance with the change, the task list 155 and resource list 158 which will be described later are changed. In the field 152, whether today is a working day or a holiday is indicated. In the initial setting,

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Saturday and Sunday are set as a holiday, and other days are set as working days. However, this can also be changed. In the field 153, today's weather is inputted. The field 154 is a memorandum field where comments regarding the daily task or the like are freely inputted.

The task list 155 showing the tasks to be implemented on the day is derived from the plan data. If the task is to be implemented (or has been implemented), the check box on the left is ticked off (clicked by a mouse). Tasks listed on the task list 155 may be deleted or a new task may be added from the work item tree of the plan data to the task list. The volume of task completed can be inputted in the today's volume field 156. The volume inputted in the field 156 corresponds to a volume of tasks achieved on the day. The value in the field 157 for the cumulative volume of tasks corresponds to the achieved task volume 65 in Fig. 6. This example shows that maintenance and repair work for 100 m^2 of driveway is implemented on March 30. Since the cumulative volume of tasks indicates 0 in Fig. 15, the task has just started on that day.

Reference numeral 158 denotes a list of resources required for the task selected from the task list. When the resource is supplied, the check box is ticked off. When each resource is ticked off on the resource

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list 158, the quantity of each resource supplied on that day is inputted in the field 159. This example shows that 25 m^3 of crushed stone for road is supplied for the maintenance and repair work for the driveway on March 30. The field 160 is a labor hour input field where a scheduled hour and an actual work hour are inputted for each task. Labor hours can be displayed in a bar chart by clicking the time chart button 161. Fig. 16 shows a time chart for each task. As can be seen from Fig. 16, the scheduled hour is shown in a blue bar graph 164 (horizontal line) and the actual work hour is shown in a green bar graph 165 (hatching), in association with each task (left column 163).

When the daily report input is completed, an update button 162 in Fig. 15 is clicked to update the data (S142 in Fig. 14). When the record data is updated, the displayed bar chart also changes. Fig. 17 shows an example of the bar chart displayed in step S143 in Fig. 14. After construction is started, if record data is inputted, the task bar graph 171 is displayed in blue 171a (horizontal line) and red 171b (vertical line) to represent the portion (ratio) of tasks completed. The ratio of the red bar graph with respect to the entire bar graph indicates the progress of the task. A green bar graph 172 (hatching) indicates days the task is implemented.

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Fig. 17 shows six bar graphs representing tasks. The top task bar graph 171 indicates the following information:

-a task using a bulldozer weighing 15 tons and having 14 horsepower is scheduled during April 23 and May 2;

-Work was done on April 23, 24, 27 and 28; and

-three-quarters of the task has been completed.

As described above, since the record data inputted in the daily report is displayed in the bar chart, the task progress can easily be ascertained. Similar to the planning stage, a bar chart can be displayed for each resource (see Fig. 10). In this case, the ratio of an actually supplied quantity with respect to a planned supply quantity is displayed in different colors. By this, the ratio of supplied resource quantity can easily be ascertained. Note that the displayed color of the bar graphs can be freely changed.

By clicking a date field 173 with a mouse, a monthly or annual bar chart can be displayed. This facilitates easy assertion of progress in a long-term construction. Moreover, by clicking a date with a mouse, the daily report input dialogue (Fig. 15) may be displayed.

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Referring back to Fig. 14, various tables may be outputted according to the updated record data (S144). This process may be executed prior to the bar chart display process (S143).

Fig. 18 is a flowchart showing the process performed in a subroutine for outputting a table. First, a table to be generated is selected on a table selection screen (S180). Next, it is determined whether or not a daily report is to be generated (S181). If a daily report is not to be generated, the control proceeds to step S183, while if a daily report is to be generated, the control proceeds to step S182. In step S182, daily report data is read out of the record data, put the data in the format of a daily work report and outputted. Output may be performed by a printer or may be transmitted on-line. Fig. 19 shows an example of a daily report output. The daily report may include all information inputted in the dialogue shown in Fig. 15.

In step S183, it is determined whether or not a work-itemized resource quantity table is to be generated. If the resource quantity table is not to be generated, the control proceeds to step S185. If the resource quantity table is to be generated, the control proceeds to step S184 where a table, including a planned resource supply quantity, an actual resource supply quantity, a cost estimate in the planning stage

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and an actual cost, is outputted with regard to a specific work item during a specified period. Output may either be performed by a printer or transmitted on-line. Fig. 20 shows an example of the work-itemized resource quantity table.

In step S185, it is determined whether or not a monthly resource supply table is to be generated. If a monthly resource supply table is not to be generated, the table output process ends. If a monthly resource supply table is to be generated, the control proceeds to step S186 where a monthly resource supply quantity is outputted in a table based on the monthly data in the record data. Fig. 21 shows an example of an outputted monthly resource supply table.

Note that the flowchart shown in Fig. 14 is merely an example of a table output process. Thus, the process of determining table generation is not limited to be performed in this order. Moreover, the above-described tables may be simultaneously outputted, or may be outputted at an arbitrary timing. Tables outputted in the aforementioned manner sufficiently serve as an official report. Therefore, mere input of daily report data achieves an easy generation of an accurate official report.

As has been described above, according to the present embodiment, planning, construction management

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of the construction site, and generation of a report can be integrally performed with easy operation without inconsistency. Furthermore, since the progress of construction can be readily ascertained, construction management can be properly executed.

Note that although the progress of a construction work is expressed by different colors of bar graphs in the present embodiment, other drawings or graphs may be utilized as long as a schedule of a task and an achieved ratio of the task are shown. For instance, the achieved ratio of a task may be expressed by changing a graph texture from the bar graph end, or by the position of a boundary line, or by varying color density or hue in the bar graph. Furthermore, a value indicative of the achieved ratio of the task may be displayed inside the bar graph.

Furthermore, according to the present embodiment, a daily volume of task completed is inputted for each task in the daily report. When the bar chart is displayed, a cumulative volume of task completed is displayed with respect to each task. However, daily volume of task completed may be inputted for a group of tasks, and the cumulative volume of task completed may be shown by a bar graph for each group of tasks.

<Second Embodiment>

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Next, a second embodiment of the present invention will be described with reference to Figs. 22 to 31. The second embodiment includes, in addition to the construction management system according to the first embodiment, the network diagram generation function and the stacking and leveling functions which will be described later. Since the other structures are the same as that of the first embodiment, description thereof will not be repeated.

In the second embodiment, a link between tasks is set when plan data is inputted in step S41 in Fig. 4. The link between tasks connects a task A, a precedent task B which must be implemented prior to implementing the task A, and a subsequent task C which can be implemented only after the task A is completed. For one task A, a plurality of precedent tasks B and/or a plurality of subsequent tasks C may be linked, or task A may be linked with no task B or task C.

Fig. 22 shows an example of a link setting screen. The screen shown in Fig. 22 is displayed by selecting a task from the schedule list having a tree structure in the left field 95 in Fig. 9 and executing a link setting command.

In the field 221 in Fig. 22, an operation subject is displayed. In other words, a task subjected to link setting is displayed. Displayed in the field 222 is a

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hierarchy of the work item, to which the task belongs. In the field 223, a list of precedent task links is displayed. In Fig. 22, "longitudinal underground drainage type 1" and "longitudinal underground drainage type 2" are set as the precedent task links of the operation subject "sediment". In other words, the screen indicates that the sediment work can be implemented only when these drainage works are completed. Moreover, in the system according to the second embodiment, by selecting with a left click, a task from the schedule list having a tree structure in the left field 95 in Fig. 9 and clicking the right click, while displaying the link setting dialogue in Fig. 22, a selected task can be set as a precedent task link.

When a task is selected from the precedent task link list 223 and then the precedent task link cancel button 224 is clicked, the selected task is deleted from the precedent task link list 223. Furthermore, in the field 225, a subsequent task link list is displayed. Similar to the button 224, a button 226 is a cancel button for deleting a selected subsequent task link from the subsequent task link list 225.

To register such task link data which has been set in the above-described manner in the HD 14, a field representing a pointer to other tasks may be provided

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in each record of the task table 324 in Fig. 32.

Next, when a network diagram display command is executed, a network diagram which reflects the links set in the foregoing process, is generated and displayed. By displaying the network diagram, relative relations between the tasks inputted as plan data can be easily viewed.

Fig. 23 shows an example of a network diagram displayed on a screen. In the construction management system according to the second embodiment, a percentage of work completion graph 232 is displayed in parallel with the network diagram 231. The percentage of work completion graph 232 can show both a planned percentage of work completion and a cumulative percentage of work completion.

The network diagram 231 and the percentage of work completion graph 232 are shown in a calendar form. Therefore, the variance of the percentage of work completion can be visually assured, while referring to the tasks in progress in the network diagram.

Fig. 24 is a network diagram extracted from the screen view shown in Fig. 23.

The network diagram includes a node 241 indicative of the contents of work item, tasks, and the task period, and an arrow 242 indicative of the sequences of the work items/tasks.

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The node 241 includes a work item node 241a and a task node 241b. In Fig. 24, the work item node 241a is represented by a circle while the task node 241b is represented by an ellipse. The node number for the work item is displayed in the work item node 241a, and in the neighbor of the work item node 241a, the name of the work item and the number of days scheduled for implementing the work (the number of days the work is actually implemented is displayed in parenthesis) are displayed. Shown in the task node 241b is the task number (center in the ellipse), the earliest task starting day with 0 being the day of construction start (top in the ellipse) (hereinafter referred to as the earliest starting day), and the latest task starting day with 0 being the day of construction start (bottom in the ellipse) (hereinafter referred to as the latest starting day). Note that the count of days is a count of working days from the 0 point, i.e., construction starting day. In the neighbor of the task node 241b, the name of the task and the number of days scheduled for implementing the task (the number of days the task is actually implemented is displayed in parenthesis) are displayed.

An arrow 242a shown in a solid line indicates a task relation representing the links set in Fig. 22, while an arrow 242b shown in a dotted line indicates a

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margin dates (float). Furthermore, when the network diagram is displayed as shown in Fig. 23, a dialogue 233 is displayed to enable various commands. The dialogue 223 shown in Fig. 23 includes ten commands as an example: initialize network diagram; raise/lower the hierarchy level to be displayed; recalculate percentage of work completion; display critical path; correction by leveling method; stacking calculation; display leveling chart; display stacking view; and task list.

If the command "display critical path" is selected from the dialogue 233, a critical path (thick arrow in Fig. 24) is derived from the float and the set links. In Fig. 24, the task node numbers 2→3→4→5→6→8→9→12 construct the critical path.

The network diagram may be generated automatically from plan data, after the generation of the bar chart described in the first embodiment. Conversely, with a set period of tasks and links between the tasks, a network diagram may be generated with the earliest starting day for all the tasks. An arbitrary plan may also be made on such network diagram by shifting a task node to the latest starting day.

When the "stacking calculation" command is selected from the dialogue 233, a stacking view display dialogue shown in Fig. 25 is displayed. A resource subjected to stacking is selected from the resource

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list 251, and the planned days, the earliest day, or the latest day is selected from the stacking day button 252, then the OK button 253 is pressed. By this, a stacking view showing the daily quantity of the selected resource is displayed (Fig. 26).

Fig. 26 is a stacking view showing the daily number of general workers in the construction plan in the network diagram of Fig. 23. The quantity of resource for each task is represented by the boxes 261.. The numeral 262 in the box 261 corresponds to the task node number.

The resource represented by the stacking view is not evenly distributed for each work day. In a case where the resource distribution is not efficient for the construction work, the "correction by leveling method" command is selected from the dialogue 233 in Fig 23. By this, the resource distribution can be averaged. The leveling is realized by shifting the starting date of tasks other than those in the critical path, taking advantage of the float, so as to keep the maximum resource quantity lower than the quantity demanded by the user. For instance, referring to Fig. 26, three general workers are required on November 9 and 10. Provided that other days require only one general worker, it is inefficient to increase the manpower only for the two days. By correcting the plan

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with the leveling method, the plan can be automatically changed to keep the number of general workers to two at the most.

Fig. 27 shows an example of a correction dialogue using the leveling method. In the field 271, priorities are set for the tasks (tasks to be prioritized are set). In the field 271, a parameter to be used in PERT (performance evaluation & review technique) calculation is selected. In the present embodiment, a designated task, a task with few total float, a task requiring short time, or a task requiring long time are selectable. Furthermore, the dialogue has a field 272 for setting a resource subjected to the leveling correction, a time period of application, and an upper limit value of the resource supply quantity.

Fig. 28 is a leveling view where the stacking view in Fig. 25 is leveled by the leveling method so as to keep the number of general workers to two at the most. The result of the correction by the leveling method is reflected on the network diagram and the task schedule (bar chart). Fig. 29 shows a network diagram which reflects the leveling operation shown in Fig. 28. Note that the starting dates for some of the tasks are changed when compared with Fig. 24. If the leveling operation results in a schedule that is inconsistent with the links set before, an error message is

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displayed.

Furthermore, if the "task list" command is selected from the dialogue 233 in Fig. 23, a list of tasks included in the leveling view is displayed as shown in Fig. 30.

Fig. 31 is a flowchart showing the correction process according to the leveling method.

First in step S310, a user inputs conditions of priority orders regarding a task, and other conditions for e.g., a resource name, a starting date and ending date for applying the leveling method, an upper limit value of the resource supply quantity and so forth, on the dialogue shown in Fig. 27. The process awaits for the OK button to be pressed. When a user completes inputting the conditions, the earliest starting day, the latest starting day and a critical path for each task is obtained for the set period by PERT (performance evaluation & review technique) analysis (S311). If the data has already been obtained by other commands, those obtained data is used.

Next, with regard to the first day of the leveling method applying period, which has been inputted by the user, a list of tasks which can be started is searched based on the obtained earliest starting day, the latest starting day and the critical path, then a startable task list is generated (S312).

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If construction work is already in progress, tasks which can be started on the first plan-changeable day, i.e., the day the leveling method is to be applied, are searched and a list of tasks is generated. The list does not include tasks in progress and tasks linked to uncompleted precedent tasks. Tasks are written in the list in the order consistent with the conditions of priority orders inputted in the dialogue by the user. Tasks on the critical path, whose starting date cannot be changed, are set as the highest priority task.

Next, tasks of highest priority order are searched from the startable task list. In other words, task data whose starting date cannot be changed is looked for. With regard to the resource set by the user in step S310, a resource quantity necessary for the task is compared to the upper limit value of the resource supply quantity (step S313). Herein, if the resource quantity required for the highest priority task is equal to or lower than the upper limit value, the task can be implemented. Therefore, the task is deleted from the startable task list and written in an implementation task list (step S314). At the same time, the resource quantity for the task, subjected to implementation, is deducted from the upper limit value.

Next, it is determined whether or not there are other tasks in the startable task list (step S315). If

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there is a task in the startable task list, the process returns to step S313.

In step S313, if the resource quantity required for the highest priority task exceeds the upper limit value of the resource supply quantity, the process proceeds to step S316 where it is determined whether or not there are any tasks which have not been started. If there is a task which has not been started, the process proceeds to step S317.

In step S317, the date is advanced, and tasks completed in the preceding dates are deleted from the implementation task list. The upper limit value of the resource supply quantity is reset to the value which has been set as the upper limit by the user. As a result of date advance, if the date passes the leveling method applying period set by the user, infinity is set for the upper limit of the resource supply quantity. Furthermore in step S318, the quantity of resources required for the tasks of the implementation task list is deducted from the upper limit value of the resource supply quantity. Then, the process returns to step S312.

If there is no task in the startable task list in step S315, the process advances to step S316 to determine whether or not there are any tasks which have not been started. If there is a task which has not

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been started, the process proceeds to step S317. If there is no task found in step S316, it is considered that all tasks subjected to implementation have been started, then the leveling operation ends and the result is displayed. If an error is found in the foregoing process, the contents of the error are displayed. Errors include, for instance, inconsistency with the set task link, the task completion date of all tasks exceeding the originally planned construction period, and so forth.

It is a general procedure to implement the above-described correction by the leveling method as shown in Fig. 31 to adjust the resource supply quantity after the user observes the stacking view shown in Fig. 25. However, it is also possible to generate a schedule for the shortest construction period while satisfying the priority order inputted by the user, by inputting conditions such that the required resource quantity does not exceed the upper limit in step S313. For instance, if the upper limit of the resource supply quantity is set in a value where plan adjustment is not necessary, the leveling process always proceeds from step S313 to S314, implementing all tasks which can be started. By this, all planned tasks are shifted to earlier dates, and as a result, a schedule for the shortest construction period can be generated.

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As has been set forth above, the second embodiment provides, in addition to the effect of the first embodiment, an effect of easy-to-understand display by expressing the relation between tasks in a network diagram. Moreover, by using the leveling method, it is possible to generate a task plan in which resources are efficiently supplied while maintaining the relations between tasks.

<Other Embodiments>

In the foregoing embodiments, CD-ROM is utilized as a storage medium for supplying program codes. Besides CD-ROM, the present invention may employ, for instance, a floppy disk, hard disk, an optical disk, a magneto-optical disk, CD-R, a magnetic tape, a non-volatile type memory card, ROM and the like.

The present invention is not limited to the above embodiments and various changes and modifications can be made within the spirit and scope of the present invention. Therefore, to appraise the public of the scope of the present invention, the following claims are made.

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WHAT IS CLAIMED IS:

1. A computer readable medium storing a construction management program for managing progress of a task related to construction, said construction management program comprising:

an acquisition program for acquiring a planned schedule, a planned volume, and an achieved volume related to the task;

a portion-of-task-completed calculation program for calculating a completed portion of the task based on the planned volume and the achieved volume acquired by said acquisition program; and

a display program for displaying on a computer screen, a bar chart having a position and length on a time axis corresponding to the planned schedule, and the bar chart itself showing the completed portion of the task.

2. The computer readable medium according to claim 1, wherein said display program is a program which expresses the completed portion of the task by color variation of the bar chart.

3. The computer readable medium according to claim 1, wherein said display program is a program for displaying an actual workday by the bar chart.

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4. The computer readable medium according to claim 1, wherein said acquisition program comprises a program for acquiring a name of the construction, a name of a work item included in the construction, a name of a task included in the work item, and respective planned schedules for the construction, the work item, and the task, and

said display program is a program for

hierarchically displaying on a computer screen the name of the construction, the name of the work item, and the name of the task acquired by said acquisition program,

displaying a bar chart, indicative of the planned schedule for the construction, at a position corresponding to the name of the construction displayed hierarchically,

displaying a bar chart, indicative of the planned schedule for the work item, at a position corresponding to the name of the work item displayed hierarchically, and

displaying a bar chart, indicative of the planned schedule for the task, at a position corresponding to the name of the task displayed hierarchically, the bar chart having a position and length on a time axis corresponding to the planned

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schedule for the task, and the bar chart itself showing the completed portion of the task.

5. The computer readable program according to claim 1, wherein said acquisition program is a program for acquiring a planned schedule, a planned volume, and an achieved volume related to a plurality of tasks, and

said display program is a program for simultaneously displaying bar charts for the plurality of tasks.

6. The computer readable program according to claim 5, wherein said acquisition program comprises a program for acquiring task link data indicative of sequential relations between the plurality of tasks, and

said display program comprises a program for displaying on a computer screen, a network diagram showing a plurality of nodes respectively having positions on the time axis corresponding to the planned schedule for the plurality of tasks, and an arrow connecting the plurality of nodes in accordance with the task link data.

7. The computer readable program according to claim 6, wherein said acquisition program further

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comprises a program for acquiring a planned supply quantity of a predetermined resource necessary for the plurality of tasks, and

said display program comprises a program for displaying a stacking view, showing the planned supply quantity of the resource for each time period, based on the planned supply quantity of the resource acquired by said acquisition program.

8. The computer readable program according to claim 7, wherein said construction management program further comprises a leveling program for changing the planned schedule of the tasks such that the planned supply quantity of the resource for each time period does not exceed a predetermined upper limit, and

said display program comprises a program for displaying the stacking view, showing on the time axis the planned supply quantity of the resource for each time period, as a leveling view in a case where the planned schedule is changed by said leveling program.

9. The computer readable medium according to claim 8, wherein said display program is a program for displaying a bar chart which reflects a change in the planned schedule of the tasks, made by said leveling program.

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10. The computer readable medium according to claim 1, wherein said acquisition program acquires, as the planned schedule and planned volume related to the task, a planned supply schedule, planned supply quantity and actual supply quantity of a resource necessary for the task,

said portion-of-task-completed calculation program is a program for calculating a portion of resource consumed as the completed portion of the task, based on the planned supply quantity and actual supply quantity of the resource, and

said display program is a program for displaying a bar chart whose length demonstrates the planned supply schedule of the resource, the bar chart itself showing the portion of resource consumed.

11. The computer readable medium according to claim 10, wherein said display program is a program for simultaneously displaying bar charts for the resource for each task, in a case where the same resource is consumed for a plurality of tasks.

12. The computer readable medium according to claim 10, wherein said acquisition program comprises a program for acquiring unit cost of the resource, and

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said construction management program further comprises a cost calculation program for calculating planned cost and actual cost spent based on the planned supply quantity, the actual supply quantity, and the unit cost of the resource.

13. A computer readable program storing a construction management program for managing progress of a task related to construction, said construction management program comprising:

an acquisition program for acquiring a name of the construction, a name of a work item included in the construction, a name of a task included in the work item, and planned schedules for the construction, the work item, and the task, and

a display program for

hierarchically displaying on a computer screen, the name of the construction, the name of the work item, and the name of the task acquired by said acquisition program,

displaying a bar chart, indicative of the planned schedule for the construction, at a position corresponding to the name of the construction displayed hierarchically,

displaying a bar chart, indicative of the planned schedule for the work item, at a position

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corresponding to the name of the work item displayed hierarchically, and

displaying a bar chart, indicative of the planned schedule for the task, at a position corresponding to the name of the task displayed hierarchically, the bar chart having a position and length on a time axis corresponding to the planned schedule for the task, and the bar chart itself showing the completed portion of the task.

14. A computer readable medium storing a construction management program for managing progress of a task related to construction, said construction management program comprising:

an acquisition program for acquiring a planned schedule for the task and storing the planned schedule in storage means;

a display program for displaying a bar chart having a position and length on a time axis corresponding to the planned schedule acquired by said acquisition program;

a bar chart change command acquisition program for acquiring a bar chart change command which changes a position and/or length of the bar chart displayed by said display program; and

a planned schedule update program for updating

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the planned schedule stored in the storage means in accordance with the bar chart change command acquired by said bar chart change command acquisition program.

15. A computer readable medium storing a construction management program for managing progress of a plurality of tasks related to construction, said construction management program comprising:

an acquisition program for acquiring a planned schedule for the plurality of tasks and task link data indicative of sequential relations between the plurality of tasks, and storing the planned schedule and the task link data in storage means; and

a display program for displaying on a computer screen, a network diagram showing a plurality of nodes respectively having positions on a time axis corresponding to the planned schedule of the plurality of tasks, and an arrow connecting the plurality of nodes in accordance with the task link data.

16. The computer readable medium according to claim 15, wherein said acquisition program further comprises a program for acquiring a planned supply quantity of a predetermined resource necessary for the plurality of tasks, and

said display program comprises a program for

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displaying a stacking view, showing a planned supply quantity of the resource for each time period.

17. The computer readable medium according to claim 16, wherein said construction management program further comprises a leveling program for changing the planned schedule of the tasks such that the planned supply quantity of the resource for each time period does not exceed a predetermined upper limit, and

said display program comprises a program for displaying the stacking view, showing on the time axis the planned supply quantity of the resource for each time period, as a leveling view in a case where the planned schedule is changed by said leveling program.

18. A construction management system for managing progress of a task related to construction, comprising:

storage means for storing a planned schedule and a planned volume related to the task;

input means for inputting an achieved volume related to the task;

portion-of-task-completed calculation means for calculating a completed portion of the task based on the planned volume stored in said storage means and the achieved volume inputted by said input means; and

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display means for displaying a bar chart, a position and length of the bar chart on a time axis representing the planned schedule, and the bar chart itself showing the completed portion of the task.

19. A construction management system for managing progress of a task related to construction, comprising:

storage means for storing a name of the construction, a name of a work item included in the construction, a name of a task included in the work item, and planned schedules for the construction, the work item, and the task; and

display means for displaying in association with each other, a schedule table which hierarchically shows the name of the construction, the name of the work item, and the name of the task stored in said storage means, a bar chart showing the planned schedule for the construction, a bar chart showing the planned schedule for the work item, and a bar chart showing the planned schedule for the task.

20. A construction management system for managing progress of a task related to construction, comprising:

storage means for storing a planned schedule for

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the task;

display means for displaying a bar chart having a position and length on a time axis corresponding to the planned schedule stored in said storage means;

bar chart change means for changing the position and/or length of the bar chart displayed by said display means; and

planned schedule update means for updating the planned schedule stored in said storage means in accordance with a change in the bar chart made by said bar chart change means.

21. A construction management method of managing progress of a task related to construction by a computer, comprising the steps of:

an acquisition step of acquiring a planned schedule, a planned volume, and an achieved volume related to the task;

a portion-of-task-completed calculation step of calculating a completed portion of the task based on the planned volume and the achieved volume acquired in said acquisition step; and

a display step of displaying a bar chart on a computer screen, a position and length of the bar chart on a time axis representing the planned schedule, and the bar chart itself showing the completed portion of

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the task.

22. A construction management method of managing progress of a task related to construction by a computer, comprising the steps of:

an acquisition step of acquiring a name of the construction, a name of a work item included in the construction, a name of a task included in the work item, and planned schedules for the construction, the work item, and the task; and

a display step of displaying in association with each other on a computer screen, a schedule table which hierarchically shows the name of the construction, the name of the work item, and the name of the task acquired in said acquisition step, a bar chart showing the planned schedule for the construction, a bar chart showing the planned schedule for the work item, and a bar chart showing the planned schedule for the task.

23. A construction management method of managing progress of a task related to construction by a computer having storage means, comprising the steps of:

a storing step of acquiring a planned schedule for the task and storing the planned schedule in the storage means;

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a display step of displaying a bar chart having a position and length on a time axis corresponding to the planned schedule acquired in said storing step;

a bar chart change command acquisition step of acquiring a bar chart change command which changes the position and/or length of the bar chart displayed in said display step; and

a planned schedule update step of updating the planned schedule stored in said storage means in accordance with a change in the bar chart made in said bar chart change command acquisition step.

24. A computer readable medium according to claim 1, wherein said computer readable medium is a CD-ROM.

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