

Title	負荷容量参照モデルに基づくプロジェクトスケジューリング方法論とツール
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A Project Scheduling Method and Tool based on Load-Capacity Model

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1 Introduction

1.1 Background

To evaluate the feasibility of a new software project, we must consider not only current workload of developers, but also remaining capacity of the organization. Based on this idea, Kusanagi proposed the Load-Capacity Model for evaluating feasibility of a new software project in the planning phase. The model assume that not only work schedules (Gantt charts) but also load-capacity diagrams are necessary for project planning. A load-capacity diagram shows the state of an organization after workloads have been assigned. Based on the Load-Capacity Model, Saito proposed a software project scheduling method. This Method use Loadgraph and Capacity-graph, which represent the workload and remaining capacity of organization respectively as inputs. Then he formulated a scheduling problem as Integer Linear Programming(ILP). By solving the ILP problem, we will get work schedules and updated load-capacity diagrams as outputs. However, we need to the knowledge about ILP and graph theory to use this method . In other word, ordinary people, who does not have those

knowledge, cannot use this method. So we need the tool which support this method.

1.2 Purpose of Research

The purpose of this research is to develop Load-Capacity Balancer(LCB). LCB is a tool,which support the software project scheduling method based on the Load-Capacity Model. Therefore, the LCB must have the following 2 major functions.

1. Graphic User Interface(GUI) to input the nessesary data, load graph, capacity graph and objective function.
2. Automatic generation of a load graph, a capacity graph, a load-capacity graph and a Gantt chart.

2 Research Approach

To develop the LCB, we analyzed the Load-Capacity model and the project scheduling method and set up the design policy. Then we defined the functional requirements of the LCB. After, that we use UML2.0 for design the structure and details of LCB. Then we develop following the design.

2.1 Design Policy

To use the Software Project Scheduling Method Based on the Load-Capacity Model, there are the following problems for ordinary project manager. First, they must understand about the Load-Capacity Model, ILP and scheduling method. Second, input effort of graphs and objective function is large. Third, creating load-capacity graph and Gantt chart from inputs are not easy. To solve these problems, the following design policies are set up.

1. The input method must be easy and the GUI must have high understandability. This can be done with the following method.First is using database for input. By using database, we can decrease the input load of user. And using understandable GUI for input and output is also necessary.

2. Automatic generation of load graph, capacity graph, load-capacity graph and Gantt chart. Load graph and capacity graph can be created by input data. And by using ILP solver(GLPK), we can create load-capacity graph and Gantt chart from input data and solver output.

3 LCB Prototype

We have developed a prototype of LCB by Java and used GLPK as ILP solver. To operate GLPK on java, we use JavaILP. The prototype is developed following design and it fulfills most of functional requirements. By using the prototype, user can input and edit the graph data and objective function by using GUI. The prototype can create the load graph and the capacity graph from user's input. The prototype also can apply the user's input and uses GLPK to operate scheduling and resource binding. Then the prototype can use the user's input and GLPK output to create load-capacity graph and Gantt chart. However, we did not develop the database in this prototype. Therefore, users have to input all of data by themselves. Moreover, we did not implement a function for adding more load graph. So user can input only 2 load graphs on this prototype.

4 Conclusion and Future work

In this research, we defined the functional requirements and design the structure of Load-Capacity Balancer, which is the tool that supports the software project scheduling method based on the Load-Capacity Model. Then we develop the prototype. The developed prototype can create the load graph and the capacity graph by using the user's input. The prototype also can create the load-capacity graph and the Gantt chart by using the user's input and ILP solver. However, we did not develop the database for this prototype. Therefore, user still has too much load on input data.

In the future, we will develop the database part of LCB and connect it to the current prototype to make the complete LCB. Then we will test and evaluated the complete the LCB. we will also improve GUI of the LCB to make it use easier.