

CrystalSoup Manual

What is CrystalSoup?

Project planning software like MSProject help project leaders to estimate the duration of their total project, given the duration of tasks. In real life, however, estimating task duration is not easy. A task may take 4 hours, if everything goes well, but can also take 8 or 10 hours if we are unlucky. When the task is on the critical path, this may have quite an impact on the total project duration.

CrystalSoup offers a simulation method to estimate the variance of project duration, given the task duration variances. In short, you can

- ◆ define tasks and their estimated duration on three levels (min, average, max)
- ◆ define dependencies between tasks (currently only finish-to-start)
- ◆ simulate multiple executions of this project, each with different settings, controlled by probabilities that are user defined.
- ◆ generate a report with the findings, so that you can use these to convince management that you really need this project buffer.
- ◆ export the statistics to excel, for when you need to prepare graphical presentations other than that provided by CrystalSoup.

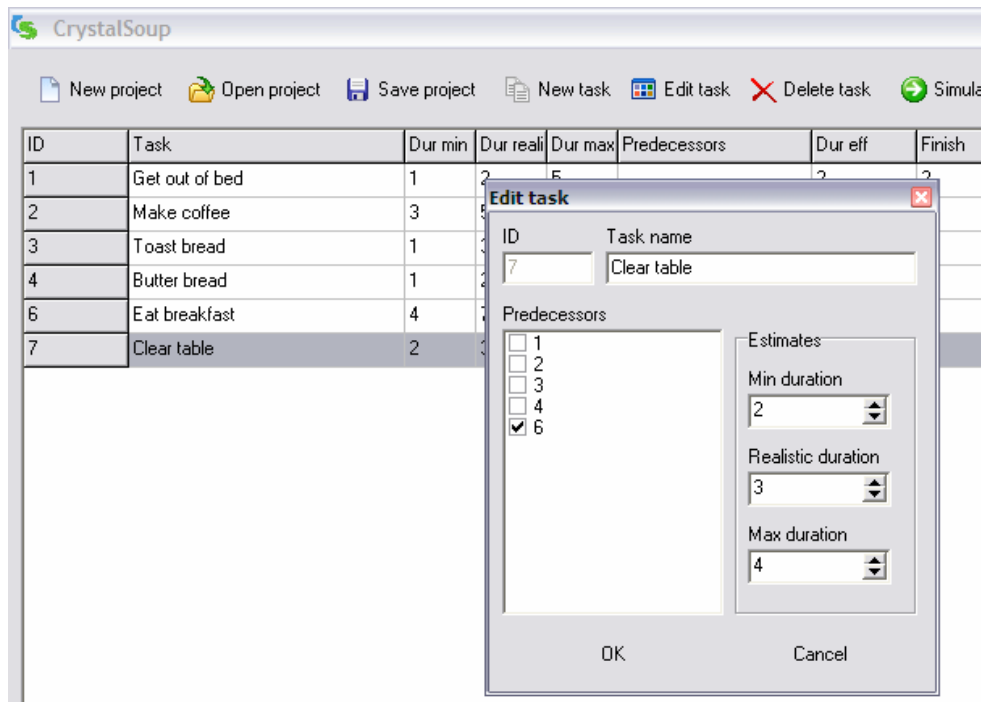
How to manage a project?

Click "Open project" and choose the project "little breakfast" that we will use as an example. We'll add the final milestone to this project: clear the table. This task has task "eat breakfast" as predecessor and has durations 2 minutes minimally, 3 on average and 4 in the worst case. Click OK and the new task appears in the table. Double click on the active task (the one that is selected in the table) to edit it.

If you need to, you can sort the tasks on ID, name, either of the duration fields, and finish time. The finish time becomes available on the moment a simulation is run and indicates the time at which the task finishes. This depends on the duration of the task itself and the finish times of the predecesing tasks.

You cannot delete tasks that are a predecessor of other tasks. First remove the relationship between the tasks, then delete the task.

If needed, you can start a new project. A new task table will be generated with 2 empty tasks.



Screenshot 1: adding the task "clear table".

How to run a simulation?

Before running a simulation, make sure the simulation settings are right.

Duration weight

- ◆ Min duration weight: controls the probability with which the minimal task duration will be the effective duration during one simulation iteration.
- ◆ Idem for the realistic duration and max duration.
- ◆ For example, if min duration weight is 1, realistic duration weight is 2 and max duration weight is 1, the minimal task duration will be chosen about 1/4 th of the time. With 1000 iterations, this means about 250 times.
- ◆ Duration weights can be any positive integer, including 0 (which means that this duration type is never chosen).
- ◆ Defaults are 1, 4, and 1 (the settings of the delphi method, see sideline box)

Iteration settings

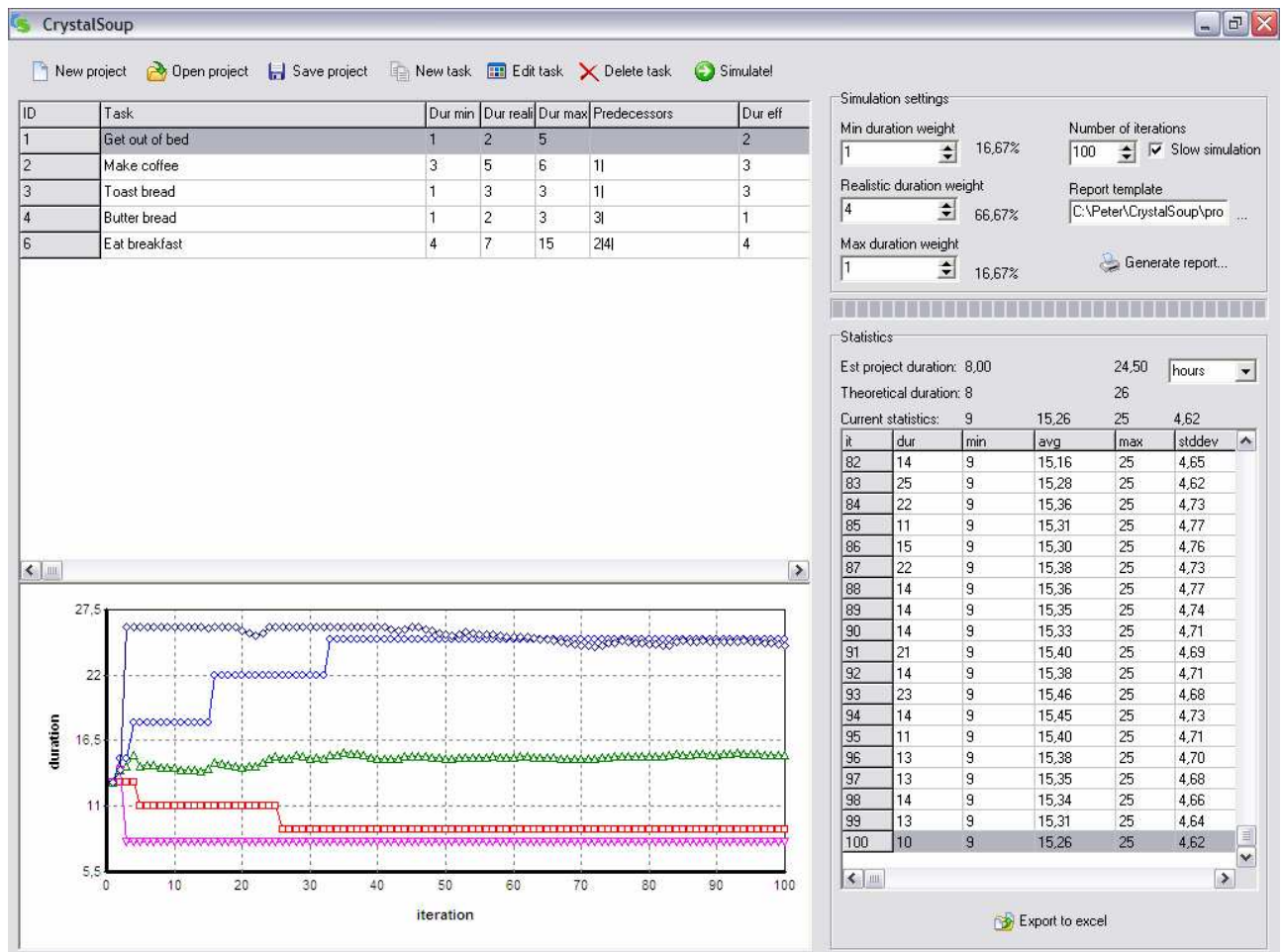
- ◆ Number of iterations: can be anything between 1 and 1000000.
- ◆ Slow simulation: check this box if you want to follow what is going on during the simulation. If this box is checked, after each iteration the graph and the statistics table will update. If unchecked, the update only happens after the simulation.

Monte Carlo methods

A monte carlo method is a computational algorithm that relies on (pseudo-) random numbers to simulate the behavior of a system that is difficult to study with traditional mathematical models. CrystalSoup uses a monte carlo method for estimating average project duration and the variance of project duration under the assumption that task duration is not fixed.

- ◆ Report template: press the ... if you want to use a different report template. See the section below on working with report templates.
- ◆ Press "simulate" to start the simulation.

How to interpret simulation statistics?



During the simulation, CrystalSoup calculates following data:

- ◆ Average project duration: the green line in the middle of the graph.
- ◆ Minimal duration: lowest duration found during simulation. The pink line in the graph.
- ◆ Theoretical minimal duration: duration if every task has an effective duration equal to the minimal duration.
- ◆ Estimated minimal duration: average duration minus twice the standard deviation (but no lower than the theoretical minimal duration). Not indicated on the graph.
- ◆ Idem for maximal durations.

After the simulation, you can export the statistics to excel for further manipulation.

The delphi method

The delphi method is a method for predicting the average duration of a task by adding the most optimistic, the most pessimistic and four times the realistic estimate and dividing the result by 6.

(not to be confused with the delphi method for getting ideas from an expert panel)

How to work with reports?

Making a report after a simulation is as easy as pressing "generate report" and choosing the name of a file. CrystalSoup then generates an HTML page and a graph, which is displayed in the report. The report is opened automatically.

Don't forget to indicate the correct units (minutes, days, months) for your project tasks. These will be exported with the durations as well.

Customizing templates: edit the tml-files in your favourite html-editor or start from scratch by using the following fields:

- ◆ %mindur% - the minimal duration of the project as simulated
- ◆ %maxdur% - the maximal duration of the project as simulated
- ◆ %avgdur% - the average duration of the project as simulated
- ◆ %stddev% - the standard deviation of the project duration
- ◆ %minestdur% - the minimal project duration as estimated (5% level)
- ◆ %maxestdur% - the maximal project duration as estimated (5% level)
- ◆ %NIterations% - the number of iterations
- ◆ %probmindur%: - the probability of minimal task duration to become effective task duration during a simulation
- ◆ %probrealistdur% - the probability of realistic task duration to become effective task duration during a simulation
- ◆ %probmaxdur%- the probability of maximal task duration to become effective task duration during a simulation
- ◆ %taskdata% - the table with tasks and their properties
- ◆ %simulationdetail% - the table with calculations for all iterations
- ◆ %generationdate% - the date at which the report was generated
- ◆ %theoreticalmindur% - the project duration if all tasks have minimal duration
- ◆ %theoreticalmaxdur% - the project duration if all tasks have maximal duration
- ◆ %rawdatagraph% - the iteration graph

This document was written by Peter Doomen on September, 14th 2007. Last version is 1.0. Copyright [AbOrigineMundi](#).