

OptDe Solver Help/Documentation

The OptDe Solver Application is an application software that is composed of three algorithms for Operations Research.

The Algorithms are:

- An Invariant Property Based Algorithm for Solving Linear Programming Problems.
- An Alternative Technique for Solving Quadratic Programming Problems.
- Modified Super Convergent Line Series Algorithm for solving Unconstrained Optimization Problems.

Installation

Install the OptDe Solver Application by double clicking on the Set up file and clicking the install button in the installation dialog. See figure below:

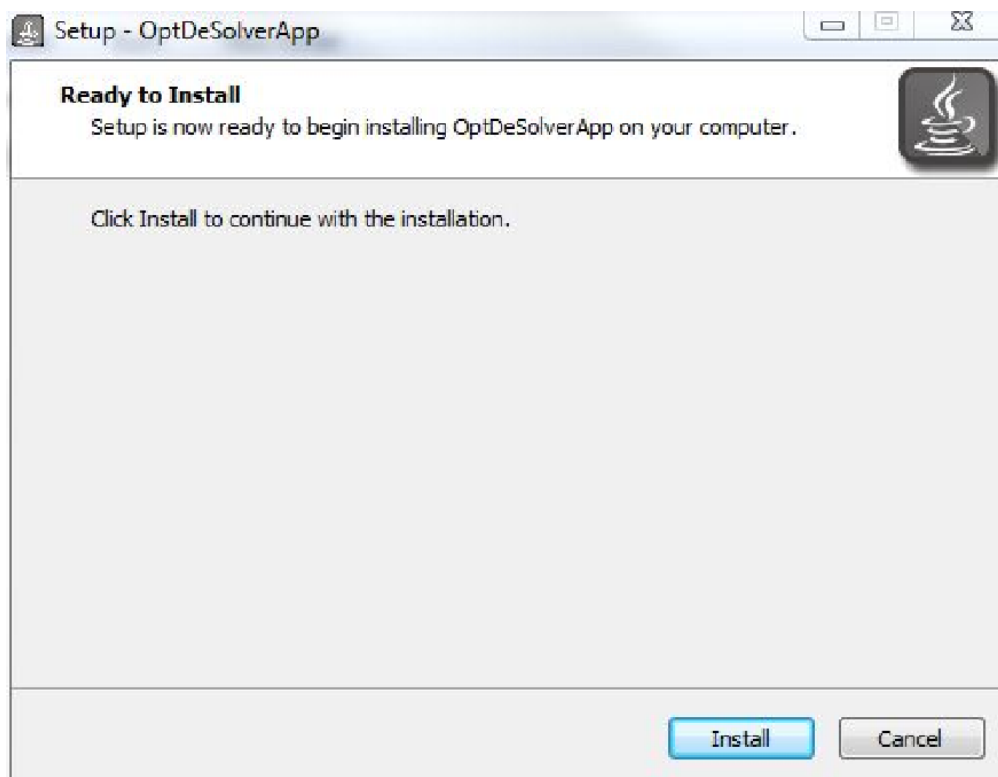


Fig. 1: The installation dialog of the OptDe Solver App.

Once the installation is complete the OptDe Solver Application will launch automatically. You can launch OptDe Solver App later by clicking on the icon on the start menu of your computer.

Instructions

The OptDe Solver Application has three navigation panels for the three algorithms, a panel for this help document and a panel for viewing saved work. See figure 2 below:

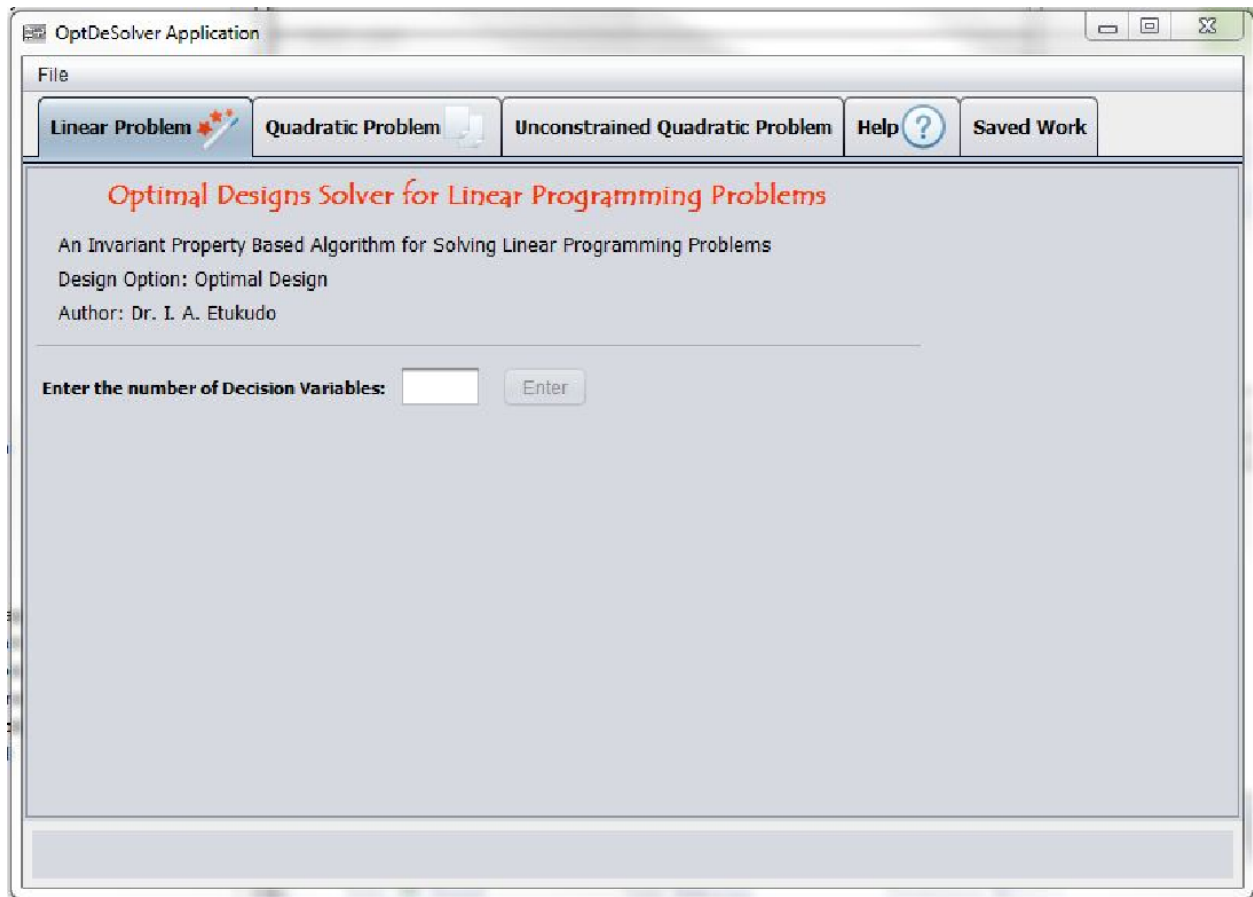


Fig. 2: The OptDe Solver Application showing the Linear Problem Panel.

Step 1: Select an algorithm from the panels available -> Linear Problem, Quadratic Problem or Unconstrained Quadratic Problem.

Step 2: Follow the instructions according to your selected algorithm. Note that in Linear Problem you will have to type the number of decision variables and then click 'Enter', while in Quadratic and Unconstrained Quadratic Problems you start by entering the values for the decision variables. Remember to choose either Minimize or Maximize depending on the problem/function you want to solve.

OptDeSolver Application

File Linear Problem Quadratic Problem Unconstrained Quadratic Problem Help Saved Work

Optimal Designs Solver for Linear Programming Problems

An Invariant Property Based Algorithm for Solving Linear Programming Problems
 Design Option: Optimal Design
 Author: Dr. I. A. Etukudo

Enter the number of Decision Variables: Enter

Minimize $f(x) =$ $x_1 +$ $x_2 +$ $x_3 +$ $x_4 +$ Constant

Fig. 3: The selection of the number of decision variables in Linear Problem.

Step 3: Input the number of constraints and click on the 'go' button.

Step 4: Fill the constraints form by entering the values for the coefficients of the variables $x_1, x_2, \dots$. Select the appropriate inequality sign for each constraint. See fig 4. Below:

OptDeSolver Application

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Optimal Designs Solver for Linear Programming Problems

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Input the number of Constraints: Go

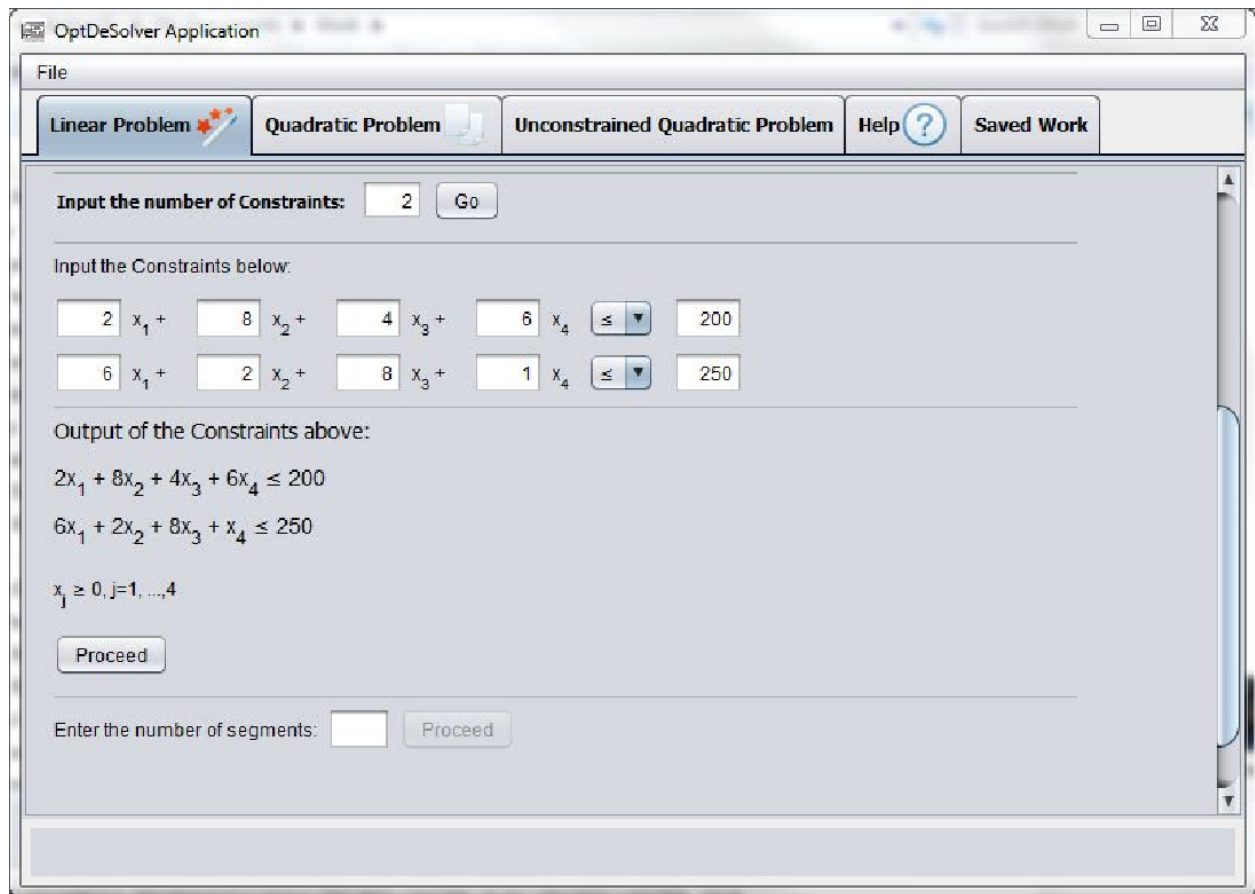
Input the Constraints below:

$x_1 +$ $x_2 +$ $x_3 +$ $x_4 \leq$

$x_1 +$ $x_2 +$ $x_3 +$ $x_4 \leq$

Fig. 4: The Constraints form for Linear Problem.

Step 5: When you have completed the constraints form, click on the ‘proceed’ button. You will be prompted for the number of segments for the initial design matrix. See figure 5 below:



OptDeSolver Application

File

Linear Problem Quadratic Problem Unconstrained Quadratic Problem Help Saved Work

Input the number of Constraints:

Input the Constraints below:

x_1 + x_2 + x_3 + x_4 $\leq$

x_1 + x_2 + x_3 + x_4 $\leq$

Output of the Constraints above:

$2x_1 + 8x_2 + 4x_3 + 6x_4 \leq 200$

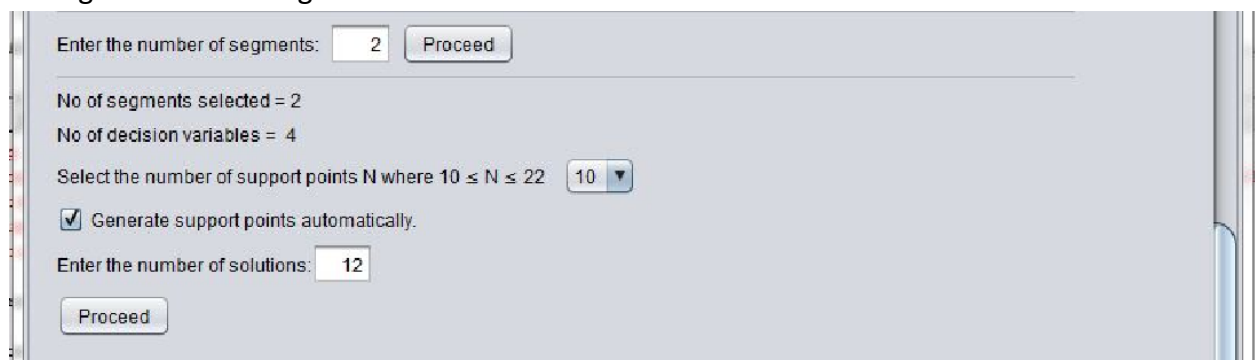
$6x_1 + 2x_2 + 8x_3 + x_4 \leq 250$

$x_j \geq 0, j=1, \dots, 4$

Enter the number of segments:

Fig. 5: The completed constraints form.

Step 6: Enter the number of segments and then click ‘proceed’. Select the number of support points for your initial design matrix. Choose automatic support points or input them manually. Note: If you select automatic support points, you will be prompted for the number of solutions to be generated. See fig. 6 below:



Enter the number of segments:

No of segments selected = 2

No of decision variables = 4

Select the number of support points N where $10 \leq N \leq 22$

☒ Generate support points automatically.

Enter the number of solutions:

Fig. 6: Automatic support points generation.

Step 7: Depending on the number of solutions required and the type of constraints, the application may display a progress bar indicating the calculation progress of all solutions. Wait for the progress bar to complete before proceeding. See fig. 7 below:

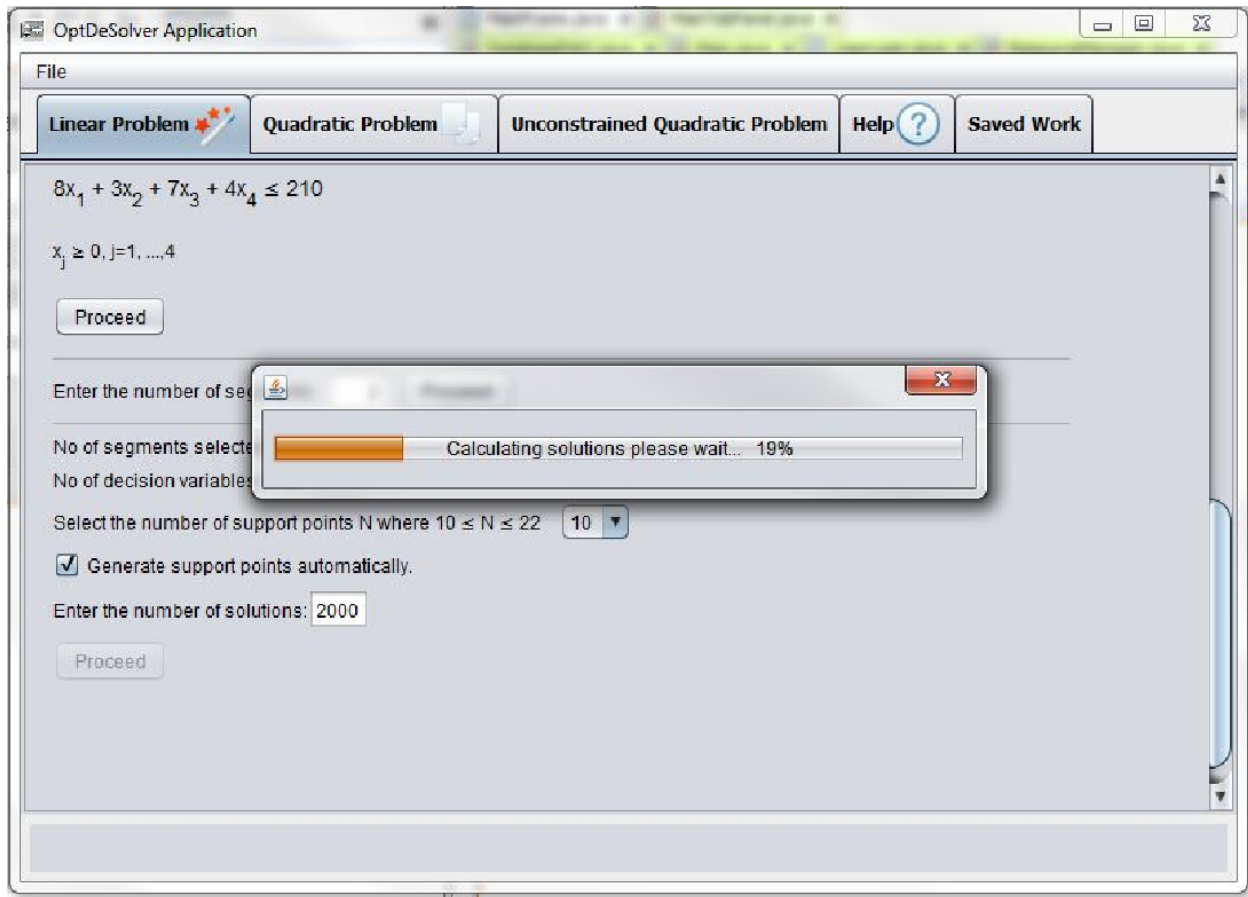


Fig. 7: The OptDe Solver App calculating 12000 solutions.

Step 8: When the process of calculating solutions is completed, the application will display the optimal solution first. Go through the solutions by scrolling down. At the bottom of the application window is a navigation panel for pagination of the solutions. You can use the arrow keys for previous and forward to go through all the solutions calculated. See fig. 8 below:

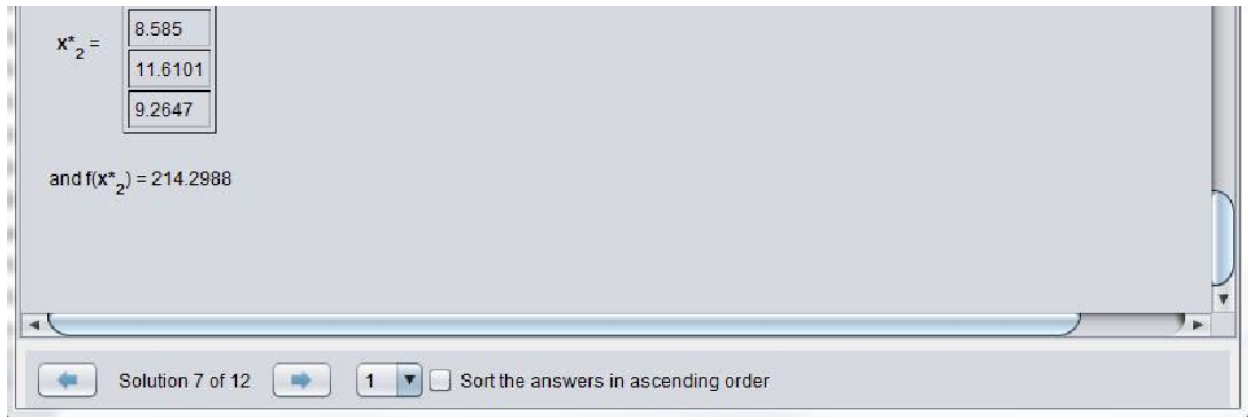


Fig. 8: The Pagination of the solutions set. The optimal solution is displayed first.

Saving your work

At any point in time or when you are done, you can save your work by clicking on 'file' -> 'save' menu, a dialog box will appear prompting you for the location to save your work. Take note of the location you are saving to, enter the file name and click on save. See fig. 9 and fig. 10 below:

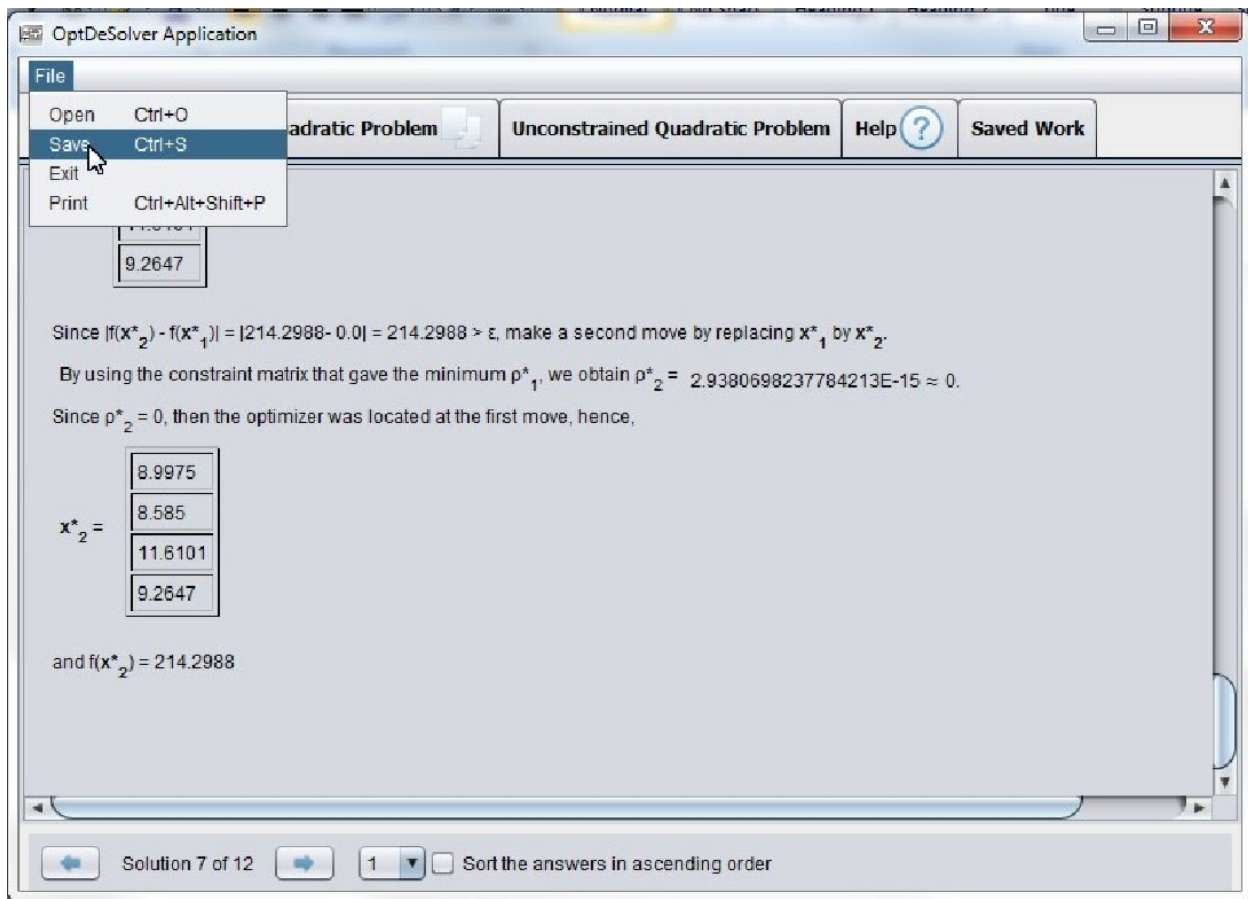


Fig. 9: Showing the file menu.

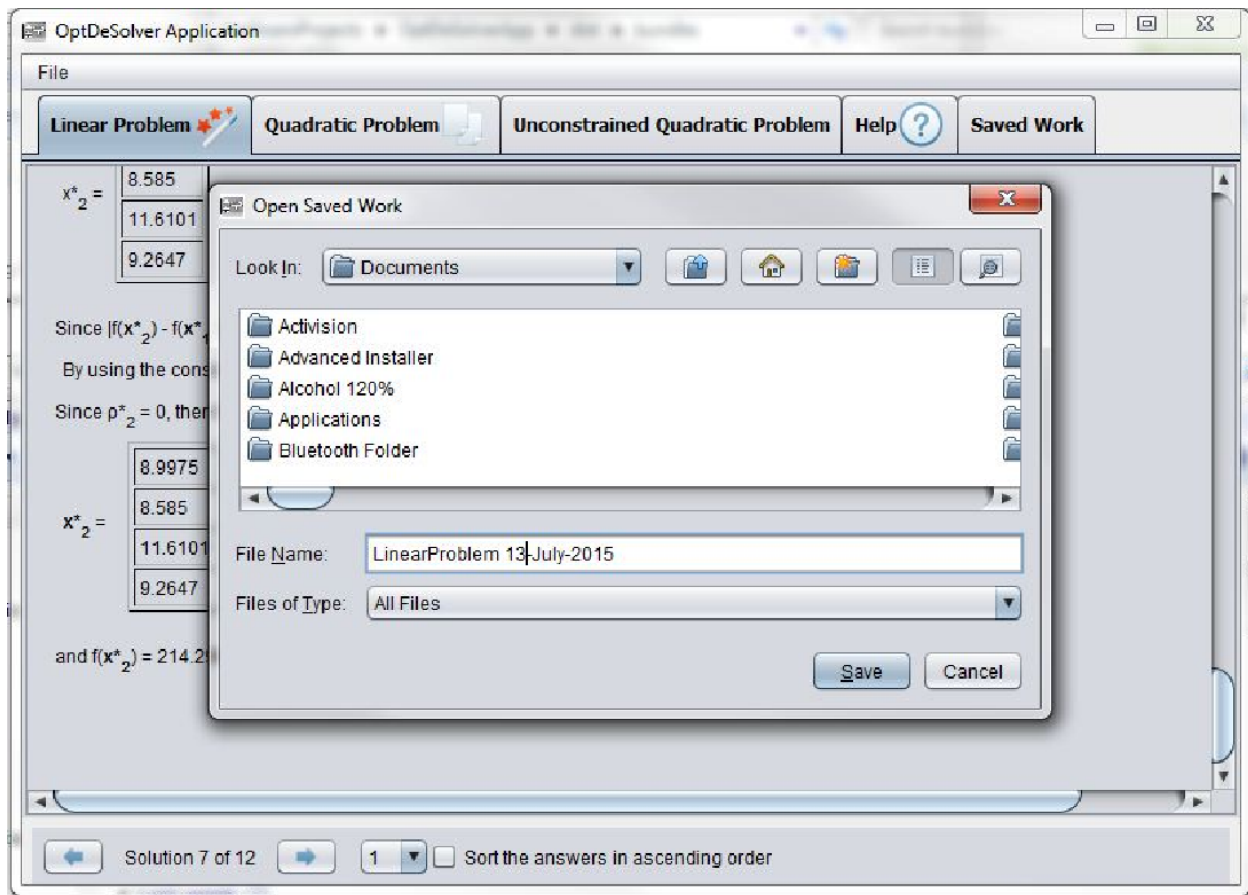


Fig. 10: Showing the save dialog box.

Opening a saved work

You can open your work to view at any time even after closing the application. Go to the panel called 'Saved Work' click on the 'File' menu then click on 'Open', a dialog window will appear. You will then select your file from the window and click on 'Open'. See Fig. 11, 12 and 13 below:

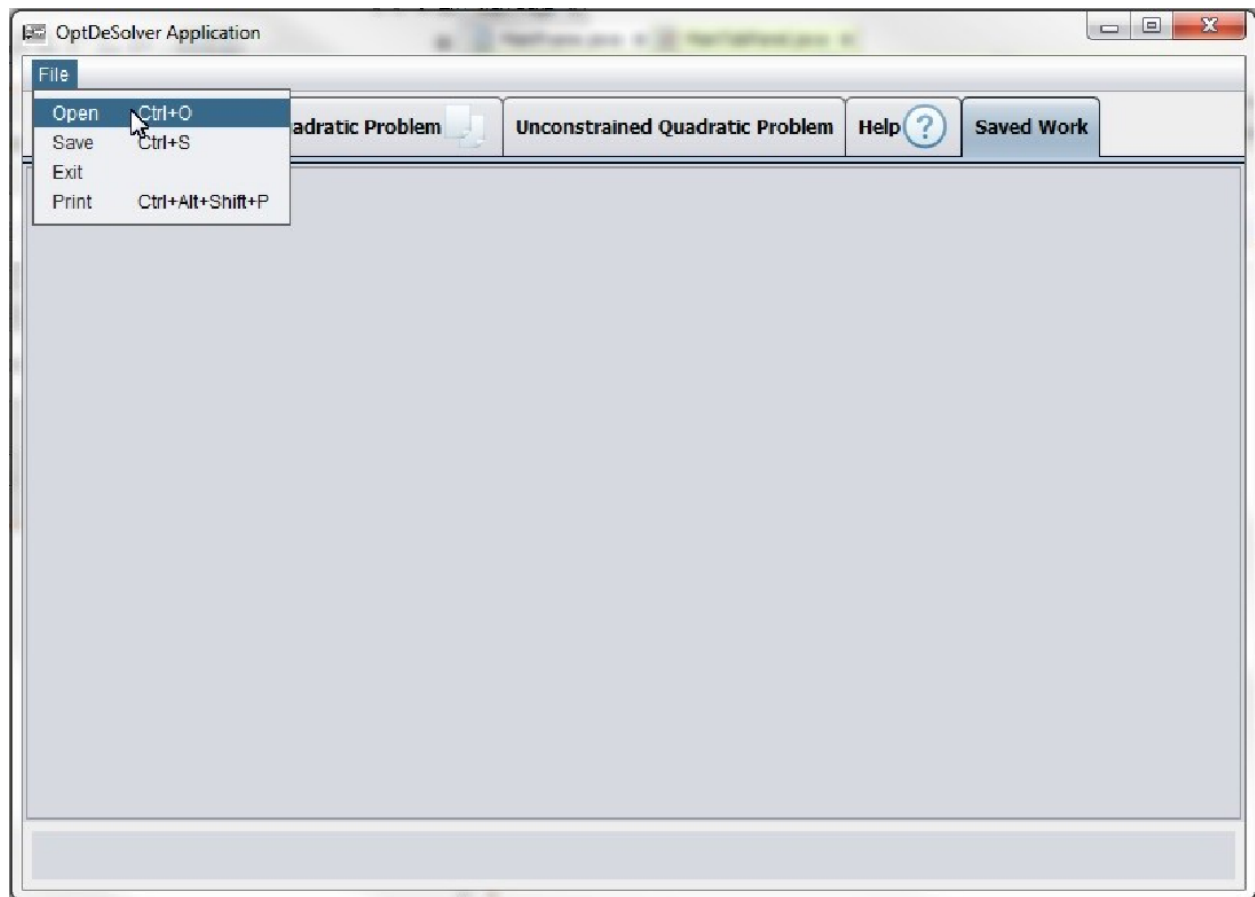


Fig. 11:

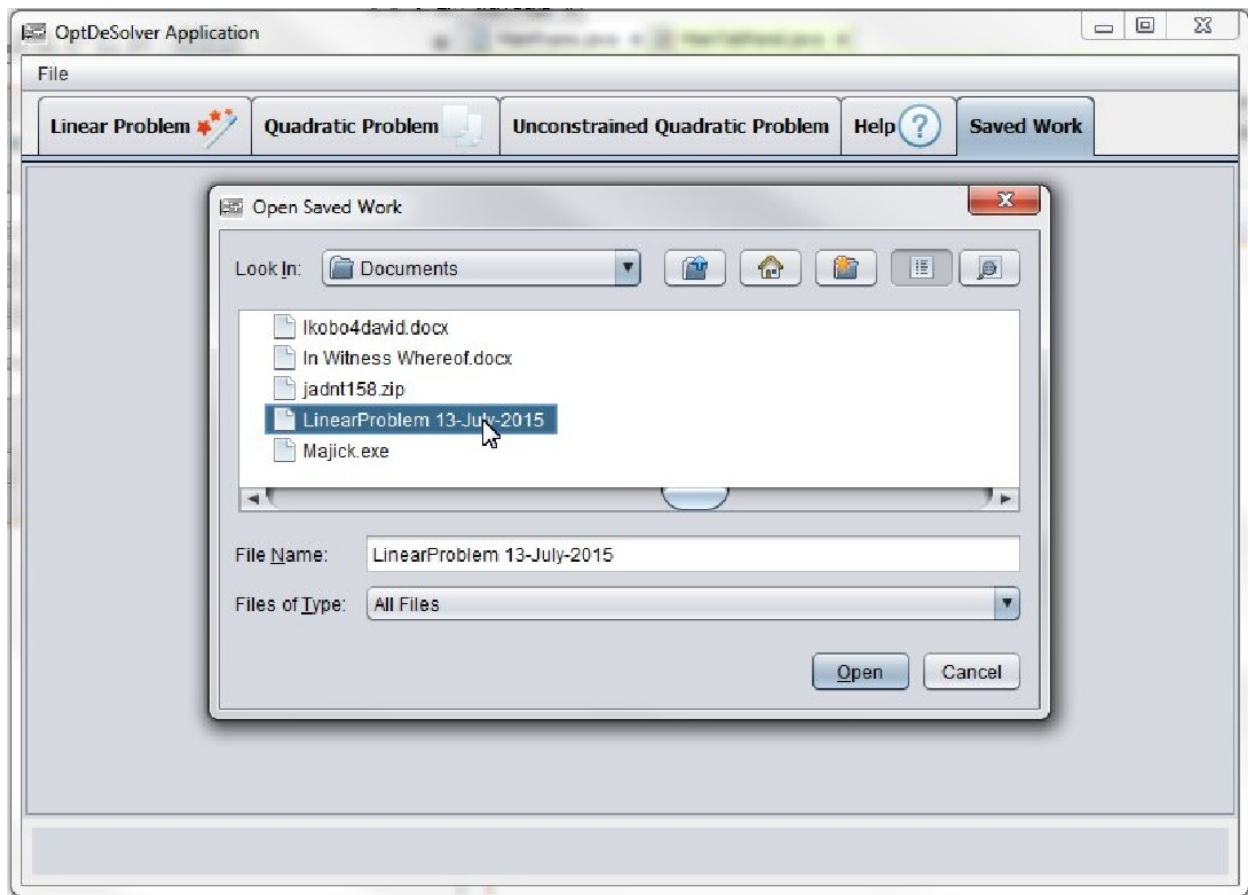


Fig. 12:

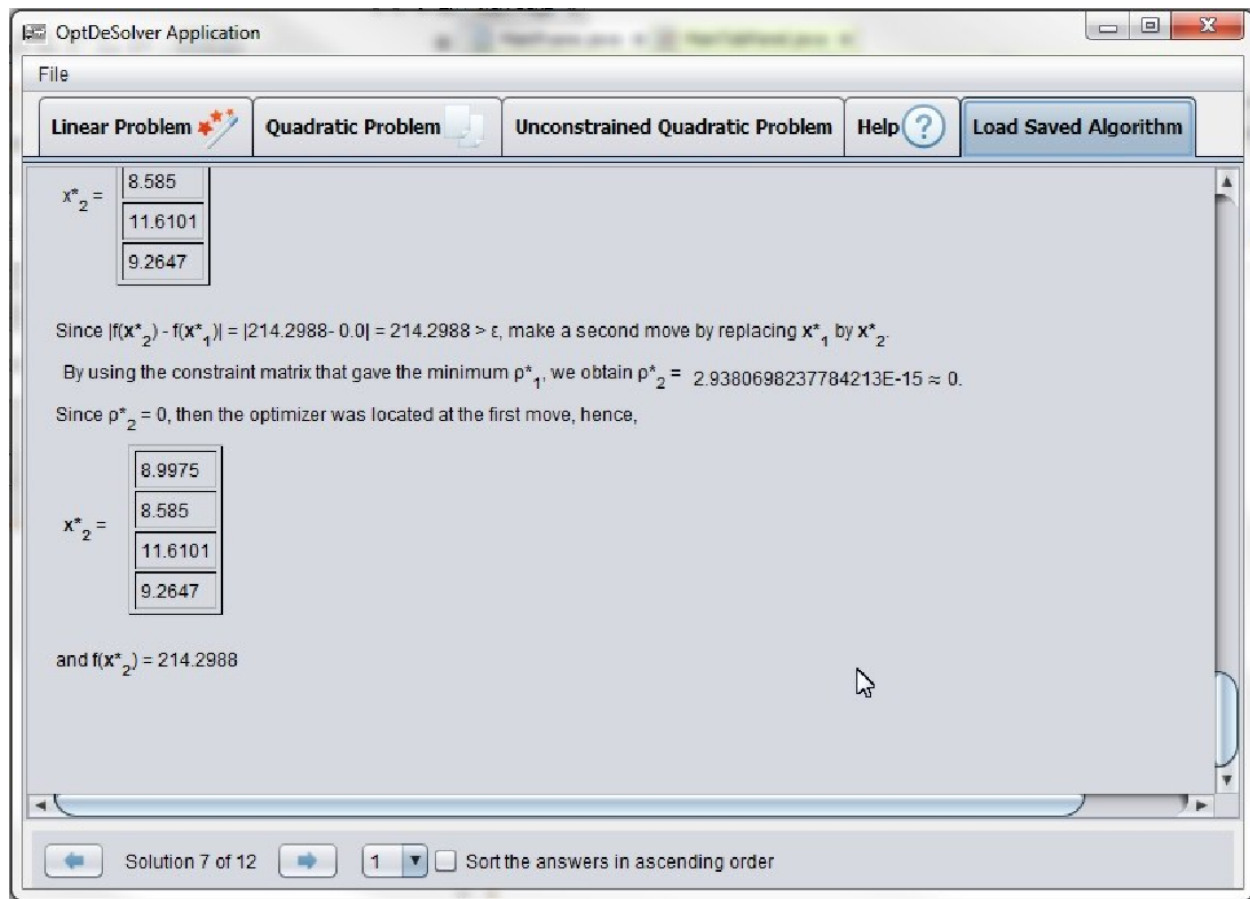


Fig. 13:

Exiting the application

The OptDe Solver App can be closed in two ways, either you use the 'file' -> 'exit' menu or you simply click on the window close button. See fig. 14 and 15.

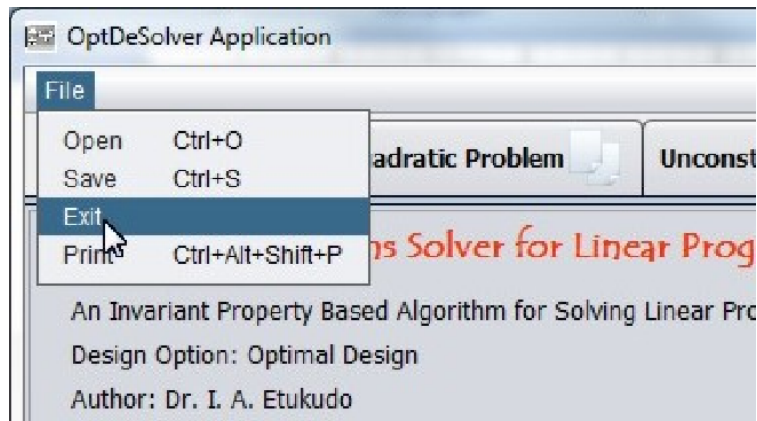


Fig. 14:

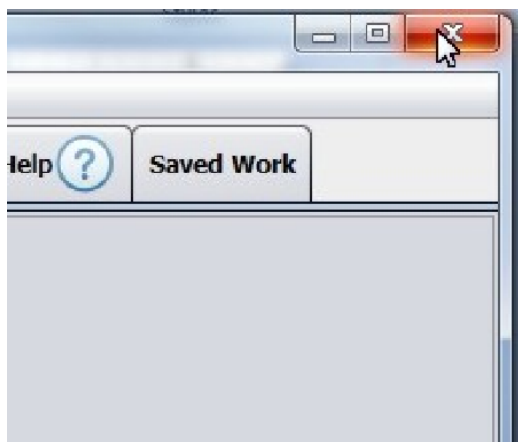


Fig. 15:

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