

**Project: MP3**  
**Course: ITM-513**  
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### **Project Description:**

The objective of this project is to create a Python tkinter GUI application that maintains a list of tasks and their priorities. We need to create a Task class to model the task datatype and its attributes. The GUI needs to allow the user to enter a new task, edit an existing task, delete an existing task, and view all the data from a selected task. The area the task list is displayed needs to implement scrollbars in order to account for more data than the window can hold.

The task list needs to color the tasks based on the task priority in some way. The task list also needs to be able to be filtered using checkboxes or radio buttons. This filtering needs to allow for ascending or descending sort order and displaying or hiding each of the priority values and completed tasks. A final requirement is to save the task list data to a file on the filesystem and reload that data the next time the application is run.

### **Installation, Compile and Run-Time Requirements:**

This project was written in Python using version 2.7.1. The scripts were written in BBEdit version 10.1.2 on the Macintosh platform. The computer used was a 2.7 GHz dual-core Intel Core i7 13" MacBook Pro with 8GB of RAM running OS X Lion 10.7.4.

This application can be executed by running the 2Dooz.py Python file in the project directory.

### **Insights and Expected Results:**

Again, in this project I tried to follow the Google Python style guide throughout my source code. This included limiting my line length to 80 characters and using their recommend formatting for code and comments.

I found the most challenging part of this project to be the tabular display of the task list. At first I thought that would be an easy thing using a grid layout. Once I started reading and researching I found that a frame with widgets in a grid layout could not use scrollbars. Scrollbars could only be used with Listbox, Canvas, Text or Entry widgets. My next thought was to use a Listbox to list the tasks. The problem I found there was all the items in the Listbox would need to be formatted the same. This would not allow me to use different colors for different priorities. I was actually kinda surprised there were no built in widgets for doing a table like this similar to the ones in Java or Visual Studio. After some research I found I would probably have to roll my own solution.

That left me with Canvas as the only real option I thought. I started experimenting with the Canvas widget and drawing text and widgets in various positions and colors on the Canvas. This was working but I saw it as a challenge to get rows and columns to perfectly line up. I was having to calculate font sizes and base my row offsets on those values in case a different system used a slightly different version of the font and it was a different height or width. It was working, but tedious. I decided to

search around the net for suggestions.

On stackoverflow.com I found a suggestion to use the Canvas element as a base widget. Then by using the Canvas method `create_window`, I was able to attach a standard Frame widget inside the Canvas widget. This allowed me to use standard tkinter widgets and a grid layout inside that Canvas widget. I bound a configure callback on the frame element that would set the Canvas scroll area to be the size of the frame whenever it changed. That took care of my scrollable data table.

The next challenge with my data table was allowing the user to click a row to select it. As I was drawing each row, I would bind a callback to the left button click on each widget. That callback was a lambda function that called my callback method. I used a lambda to call the method because in addition to passing it the event I needed to pass the row position we were in. That allowed me to know which index in the list was selected.

I decided to use addition top level windows for my editing of tasks and adding new tasks. I decided to make these windows modal so you had to finish with them before you could go back to the application and do any other operations. I was able to largely reuse the code for the add window for the edit window with some minor name changes. One reason I chose to use this approach was to get some experience using other windows in an application and passing data from one to the other.

The sorting was handled by calling the sort function on the data list using a lambda function as the sort key. I chose to store a numeric value for priority in the Task object to make sorting easier. In the Task module I defined a few dictionaries to serve as translation constants to convert from integer to string value.

The filtering checkboxes store their state in class attributes. Every time I draw the rows of the data table I used a method to check if the given task should be filtered out and not shown. That filter method was basically a set of nested conditionals that returned true or false. The checkbox change callback basically just forced the table to redraw.

I decided to use the pickle module to do my persistent file storage. I decided to do this because I could store my entire list of Task objects at one time in a serialized fashion and easily reload that file into the list on relaunch. This kept me from having to individually write out each object and also create methods to read and parse them back in. This solution saved time and worked perfectly.

### **Screenshots Demonstrating Application:**

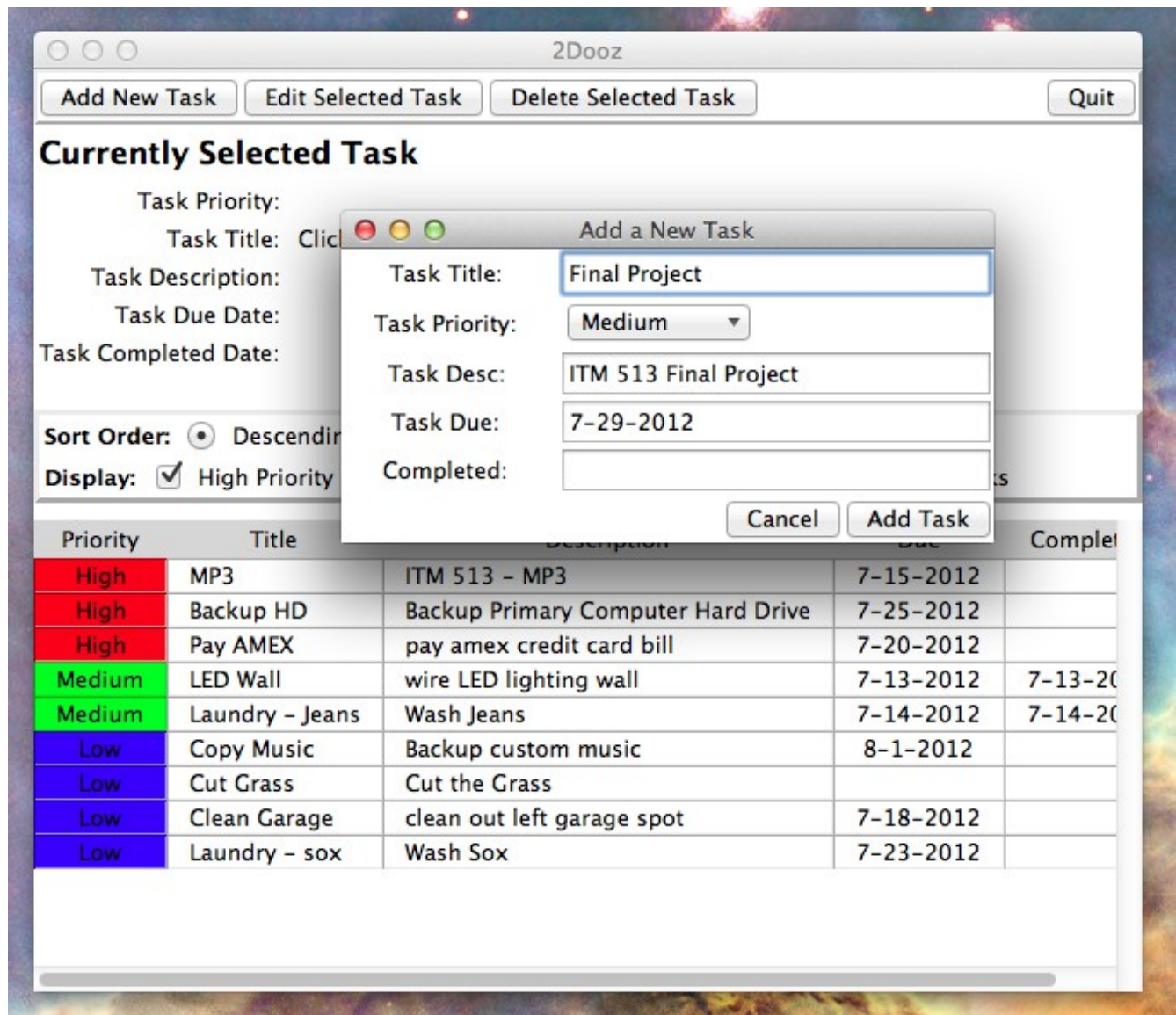
Screenshots appear on the following pages.

This screenshot shows the application launching without a saved data file and starting with a blank task list. This is what you get if the data file does not exist.

The screenshot shows a macOS-style window titled "2Dooz". At the top, there are four buttons: "Add New Task", "Edit Selected Task", "Delete Selected Task", and "Quit". Below these buttons is a section titled "Currently Selected Task". This section contains five labels: "Task Priority:", "Task Title: Click A Task To Select", "Task Description:", "Task Due Date:", and "Task Completed Date:". Below this section is a "Sort Order" section with two radio buttons: "Descending" (selected) and "Ascending". Below that is a "Display" section with four checked checkboxes: "High Priority", "Medium Priority", "Low Priority", and "Completed Tasks". At the bottom of the window is a table with five columns: "Priority", "Title", "Description", "Due", and "Completed". The table is currently empty.

Priority	Title	Description	Due	Completed
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This screenshot shows the add new task window and a populated task list in the main application window.



This screenshot shows the Final Project from the last screenshot added in the list.

2Dooz

Add New Task Edit Selected Task Delete Selected Task Quit

### Currently Selected Task

Task Priority:  
Task Title: Click A Task To Select  
Task Description:  
Task Due Date:  
Task Completed Date:

Sort Order: ☒ Descending ☐ Ascending

Display: ☒ High Priority ☒ Medium Priority ☒ Low Priority ☒ Completed Tasks

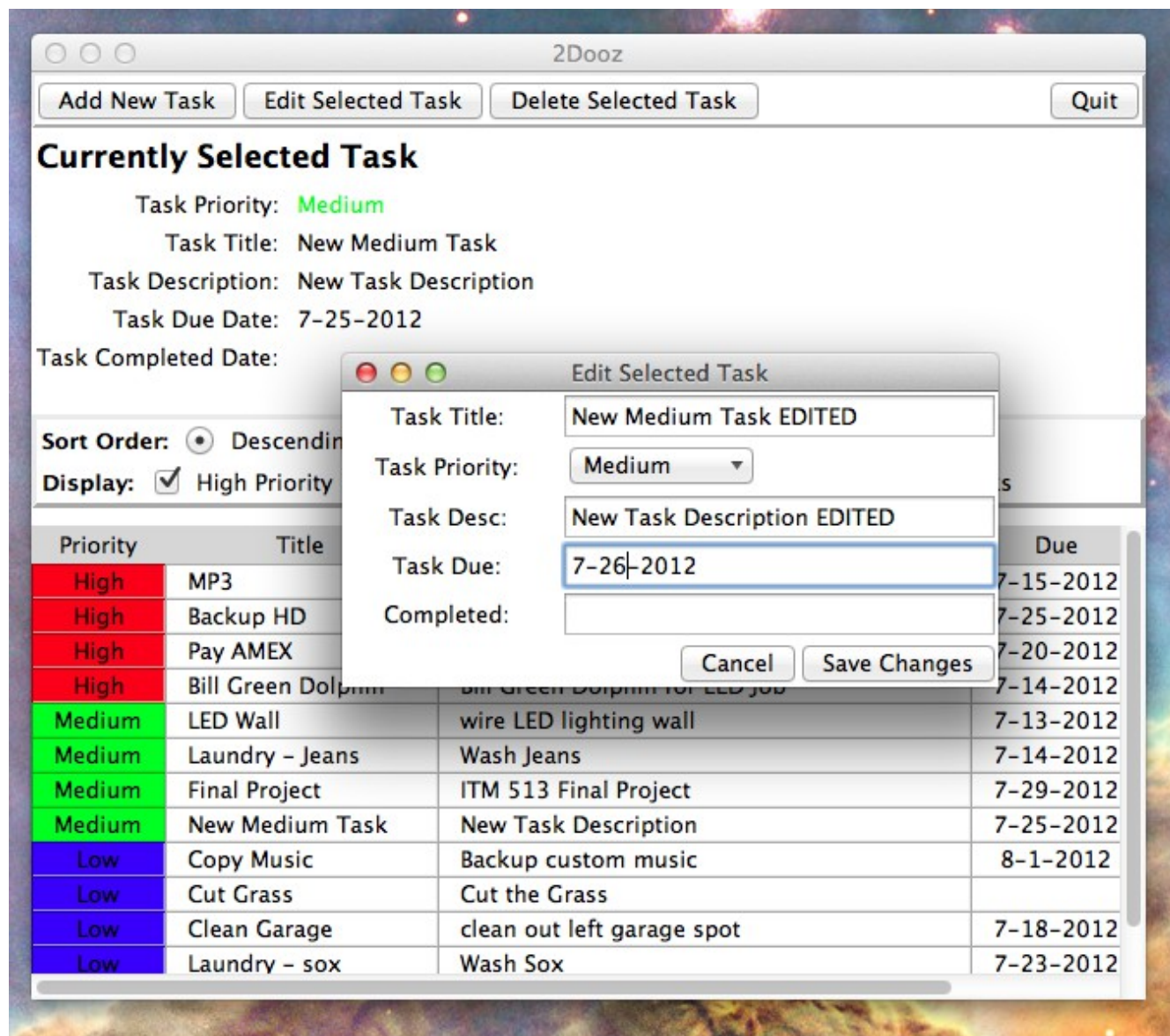
Priority	Title	Description	Due	Comp
High	MP3	ITM 513 - MP3	7-15-2012	
High	Backup HD	Backup Primary Computer Hard Drive	7-25-2012	
High	Pay AMEX	pay amex credit card bill	7-20-2012	
High	Bill Green Dolphin	Bill Green Dolphin for LED Job	7-14-2012	7-14-
Medium	LED Wall	wire LED lighting wall	7-13-2012	7-13-
Medium	Laundry - Jeans	Wash Jeans	7-14-2012	7-14-
Medium	Final Project	ITM 513 Final Project	7-29-2012	
Low	Copy Music	Backup custom music	8-1-2012	
Low	Cut Grass	Cut the Grass		
Low	Clean Garage	clean out left garage spot	7-18-2012	
Low	Laundry - sox	Wash Sox	7-23-2012	

This screenshot shows a task that has been selected and the details are shown in the top portion of the GUI. The MP3 task was clicked.

The screenshot shows a macOS-style window titled "2Dooz". At the top, there are four buttons: "Add New Task", "Edit Selected Task", "Delete Selected Task", and "Quit". Below these buttons is a section titled "Currently Selected Task". This section contains the following details: "Task Priority: High" (with "High" in red), "Task Title: MP3", "Task Description: ITM 513 - MP3", "Task Due Date: 7-15-2012", and "Task Completed Date:". Below the details section, there are two rows of controls. The first row is "Sort Order:" with a selected radio button for "Descending" and an unselected one for "Ascending". The second row is "Display:" with four checked checkboxes: "High Priority", "Medium Priority", "Low Priority", and "Completed Tasks". At the bottom of the window is a table with four columns: "Priority", "Title", "Description", and "Due". The table contains 13 rows of tasks, with the first row highlighted in red to match the selected task details above.

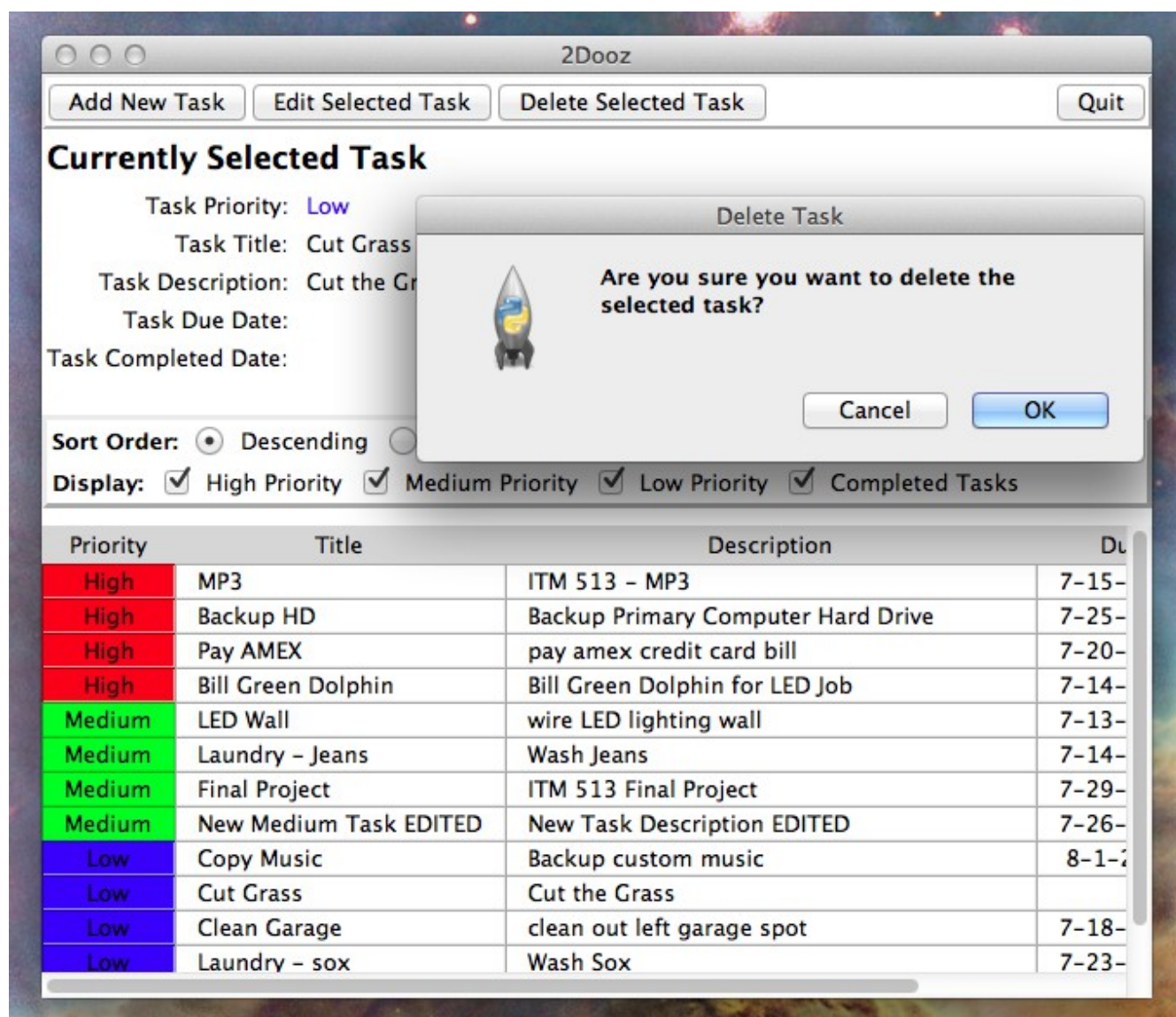
Priority	Title	Description	Due
High	MP3	ITM 513 - MP3	7-15-2012
High	Backup HD	Backup Primary Computer Hard Drive	7-25-2012
High	Pay AMEX	pay amex credit card bill	7-20-2012
High	Bill Green Dolphin	Bill Green Dolphin for LED Job	7-14-2012
Medium	LED Wall	wire LED lighting wall	7-13-2012
Medium	Laundry - Jeans	Wash Jeans	7-14-2012
Medium	Final Project	ITM 513 Final Project	7-29-2012
Medium	New Medium Task	New Task Description	7-25-2012
Low	Copy Music	Backup custom music	8-1-2012
Low	Cut Grass	Cut the Grass	
Low	Clean Garage	clean out left garage spot	7-18-2012
Low	Laundry - sox	Wash Sox	7-23-2012

This screenshot shows the edit selected task window with some of the data fields changed.





This screenshot shows the delete task confirmation that comes up when clicking on the delete selected task button. First the Cut Grass task was clicked then the delete button was clicked.





This screenshot shows the list sorted in ascending order. Also notice the cut grass task that was deleted in the last screenshot is not in the list.

The screenshot shows the 2Dooz application window. At the top, there are three buttons: "Add New Task", "Edit Selected Task", and "Delete Selected Task", followed by a "Quit" button. Below these is a section titled "Currently Selected Task" with fields for "Task Priority:", "Task Title: Click A Task To Select", "Task Description:", "Task Due Date:", and "Task Completed Date:". Below this section are "Sort Order:" radio buttons for "Descending" and "Ascending" (selected), and "Display:" checkboxes for "High Priority", "Medium Priority", "Low Priority", and "Completed Tasks" (all selected). At the bottom is a table with four columns: "Priority", "Title", "Description", and "Due Date". The table contains 14 tasks, sorted by priority (Low, Medium, High) and then by due date within each priority group. The "Low" priority tasks are highlighted in blue, "Medium" in green, and "High" in red.

Priority	Title	Description	Due Date
Low	Copy Music	Backup custom music	8-1-2
Low	Clean Garage	clean out left garage spot	7-18-
Low	Laundry - sox	Wash Sox	7-23-
Low	Clean Office	Clean all papers off desks in computer room	8-1-2
Low	Completed Low Task	Completed Low Priortiy Task	7-10-
Medium	LED Wall	wire LED lighting wall	7-13-
Medium	Laundry - Jeans	Wash Jeans	7-14-
Medium	Final Project	ITM 513 Final Project	7-29-
Medium	New Medium Task EDITED	New Task Description EDITED	7-26-
High	MP3	ITM 513 - MP3	7-15-
High	Backup HD	Backup Primary Computer Hard Drive	7-25-
High	Pay AMEX	pay amex credit card bill	7-20-

This screenshot shows the list being filtered to only show High and Medium Priority tasks. Completed tasks are also filtered out.

The screenshot shows a window titled "2Dooz" with a standard macOS-style title bar. Below the title bar are three buttons: "Add New Task", "Edit Selected Task", and "Delete Selected Task", followed by a "Quit" button in the top right corner.

Below the buttons is a section titled "Currently Selected Task" with the following labels:  
Task Priority:  
Task Title: Click A Task To Select  
Task Description:  
Task Due Date:  
Task Completed Date:

Below this section are two rows of controls:  
Sort Order: ☒ Descending ☐ Ascending  
Display: ☒ High Priority ☒ Medium Priority ☐ Low Priority ☐ Completed Tasks

Below the controls is a table with the following data:

Priority	Title	Description	Due	Completed
High	MP3	ITM 513 - MP3	7-15-2012	
High	Backup HD	Backup Primary Computer Hard Drive	7-25-2012	
High	Pay AMEX	pay amex credit card bill	7-20-2012	
Medium	Final Project	ITM 513 Final Project	7-29-2012	
Medium	New Medium Task EDITED	New Task Description EDITED	7-26-2012	

This screenshot shows the filters being applied again. This time only High Priority tasks are shown. This view also shows completed tasks.

The screenshot shows the 2Dooz application window. At the top, there are three buttons: "Add New Task", "Edit Selected Task", and "Delete Selected Task", followed by a "Quit" button. Below these is a section titled "Currently Selected Task" which displays the following information: Task Priority: High, Task Title: MP3, Task Description: ITM 513 - MP3, Task Due Date: 7-15-2012, and Task Completed Date: (empty). Below this section are two rows of controls. The first row is "Sort Order:" with "Descending" selected (radio button) and "Ascending" (radio button). The second row is "Display:" with "High Priority" (checked checkbox), "Medium Priority" (unchecked checkbox), "Low Priority" (unchecked checkbox), and "Completed Tasks" (checked checkbox). Below the controls is a table with five columns: Priority, Title, Description, Due, and Completed. The table contains four rows of tasks, all with a priority of "High". The first row is "MP3" with description "ITM 513 - MP3" and due date "7-15-2012". The second row is "Backup HD" with description "Backup Primary Computer Hard Drive" and due date "7-25-2012". The third row is "Pay AMEX" with description "pay amex credit card bill" and due date "7-20-2012". The fourth row is "Bill Green Dolphin" with description "Bill Green Dolphin for LED Job", due date "7-14-2012", and completed date "7-14-2012".

2Dooz

Add New Task Edit Selected Task Delete Selected Task Quit

**Currently Selected Task**

Task Priority: High  
Task Title: MP3  
Task Description: ITM 513 - MP3  
Task Due Date: 7-15-2012  
Task Completed Date:

Sort Order: ☒ Descending ☐ Ascending

Display: ☒ High Priority ☐ Medium Priority ☐ Low Priority ☒ Completed Tasks

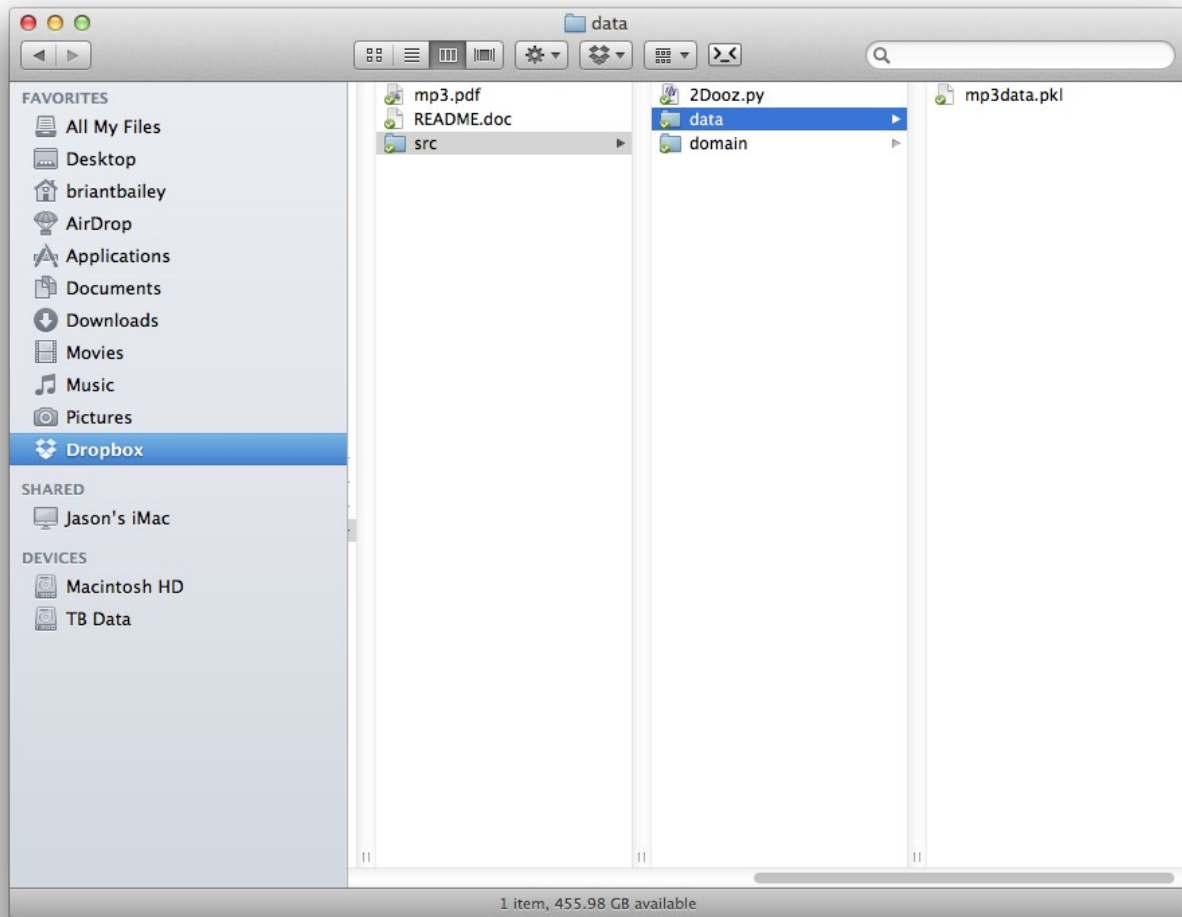
Priority	Title	Description	Due	Completed
High	MP3	ITM 513 - MP3	7-15-2012	
High	Backup HD	Backup Primary Computer Hard Drive	7-25-2012	
High	Pay AMEX	pay amex credit card bill	7-20-2012	
High	Bill Green Dolphin	Bill Green Dolphin for LED Job	7-14-2012	7-14-2012

This screenshot shows the application after it has launched again. All of the saved tasks are loaded from the file. Default descending sort order and all tasks are shown.

The screenshot shows a macOS-style window titled "2Dooz". At the top, there are four buttons: "Add New Task", "Edit Selected Task", "Delete Selected Task", and "Quit". Below these is a section titled "Currently Selected Task" with labels for "Task Priority:", "Task Title: Click A Task To Select", "Task Description:", "Task Due Date:", and "Task Completed Date:". Below this is a "Sort Order:" section with radio buttons for "Descending" (selected) and "Ascending". Below that is a "Display:" section with checkboxes for "High Priority", "Medium Priority", "Low Priority", and "Completed Tasks", all of which are checked. At the bottom is a table with five columns: "Priority", "Title", "Description", "Due", and "Comp". The table contains 14 rows of tasks, with priority levels indicated by colored background cells in the "Priority" column.

Priority	Title	Description	Due	Comp
High	MP3	ITM 513 - MP3	7-15-2012	
High	Backup HD	Backup Primary Computer Hard Drive	7-25-2012	
High	Pay AMEX	pay amex credit card bill	7-20-2012	
High	Bill Green Dolphin	Bill Green Dolphin for LED Job	7-14-2012	7-14-
Medium	LED Wall	wire LED lighting wall	7-13-2012	7-13-
Medium	Laundry - Jeans	Wash Jeans	7-14-2012	7-14-
Medium	Final Project	ITM 513 Final Project	7-29-2012	
Medium	New Medium Task EDITED	New Task Description EDITED	7-26-2012	
Low	Copy Music	Backup custom music	8-1-2012	
Low	Clean Garage	clean out left garage spot	7-18-2012	
Low	Laundry - sox	Wash Sox	7-23-2012	
Low	Clean Office	Clean all papers off desks in computer room	8-1-2012	

This screenshot shows the project directory and the mp3data.pkl file.



This final screenshot shows the project directory and the contents of the domain package.

