Xdom : A Graphical, X-based Front-End for Domineering
A User's Manual

Dan Garcia
ddgarcia@cs.berkeley.edu
Computer Science Division, 535 Soda Hall
University of California at Berkeley
Berkeley, CA 94720
510-642-9716
(Revision 1 corresponding to Xdom Version 1.0)
Software available at http://http.cs.berkeley.edu/ ddgarcia/software/xdom/

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This document describes how to use Xdom, a graphical, X-based front-end for Domineering. Xdom allows users interested in the game of Domineering to:

- Easily edit new positions;
- Load existing positions from files;
- Save new positions into files;
- Determine the value of any position (can also turn this feature off);
- Determine the predicted winner of any position (can also turn this feature off);
- Show only Left's available moves, Right's available moves, both, or neither;
- Personalize a game by entering the names of the Left and Right players;
- Undo a bad move which reverts to a previous position;
- Start a game over which reverts to the original loaded position;
- Request a "hint" which highlights the best move;
- Interactively play Domineering against a friend;
- Interactively play Domineering against the computer (using the "hint" facility).

1 Prior Work : `games`

David Wolfe (wolfe@cs.berkeley.edu) created the Gamesman's Toolkit (also known as `games`), a powerful text-based game-analysis program which allows users to explore various components of combinatorial games, as well as determine values of Domineering positions. Unfortunately, the program does have some shortcomings. It is not interactive, and will not "play" Domineering with the user, nor will it indicate which is the best move for Left or Right. Xdom addresses these issues by providing this functionality to the user. Let's consider how users interacted with Domineering through the `games` prior to the existence of Xdom.

```
unix% games
Type help, if you need it, control-D to exit
> dom
Enter Domineering position followed by extra <cr>
* *** ***
* * * * *
*** ***

3/4
>
```

As you will see, the interaction with Xdom allows for much more than just determining the value of a Domineering position. Let's start at the beginning.

2 Starting up Xdom

Starting up Xdom is simple - from the directory containing the Xdom file, simply type Xdom:

```
unix% Xdom
```

Xdom supports two command-line arguments, which are the initial Domineering position (.dom file) to load and the size of the slots on the board in pixels. Each domino takes up two slots. The default is the full 4x3 board and 60 pixels/slot. It is important that slot size (in pixels) be a multiple of 3. For example, to have Xdom boot with `bigsnake.dom` as its configuration and 30 pixels as its slot size, one would type:

```
unix% Xdom bigsnake.dom 30
```

Once Xdom has booted, it creates two windows, the main Xdom window and the Domineering window. The Xdom window allows the user to interact with the program, show/hide values and predictions, show/hide the moves on the board, create new Domineering positions, load old positions from files, or save existing positions into files. Let us first focus on interacting with the Domineering window itself.

3 The features of Xdom

This section describes all of the features of Xdom, e.g. interacting with the Domineering window, displaying hints, editing the positions, and loading and saving positions to name a few.

3.1 Interacting with the Domineering window

In this window there are grey "slots", miniature North-South blue rectangles (Left's moves), miniature West-East red rectangles (Right's moves), and perhaps off-yellow blank spaces. To specify a

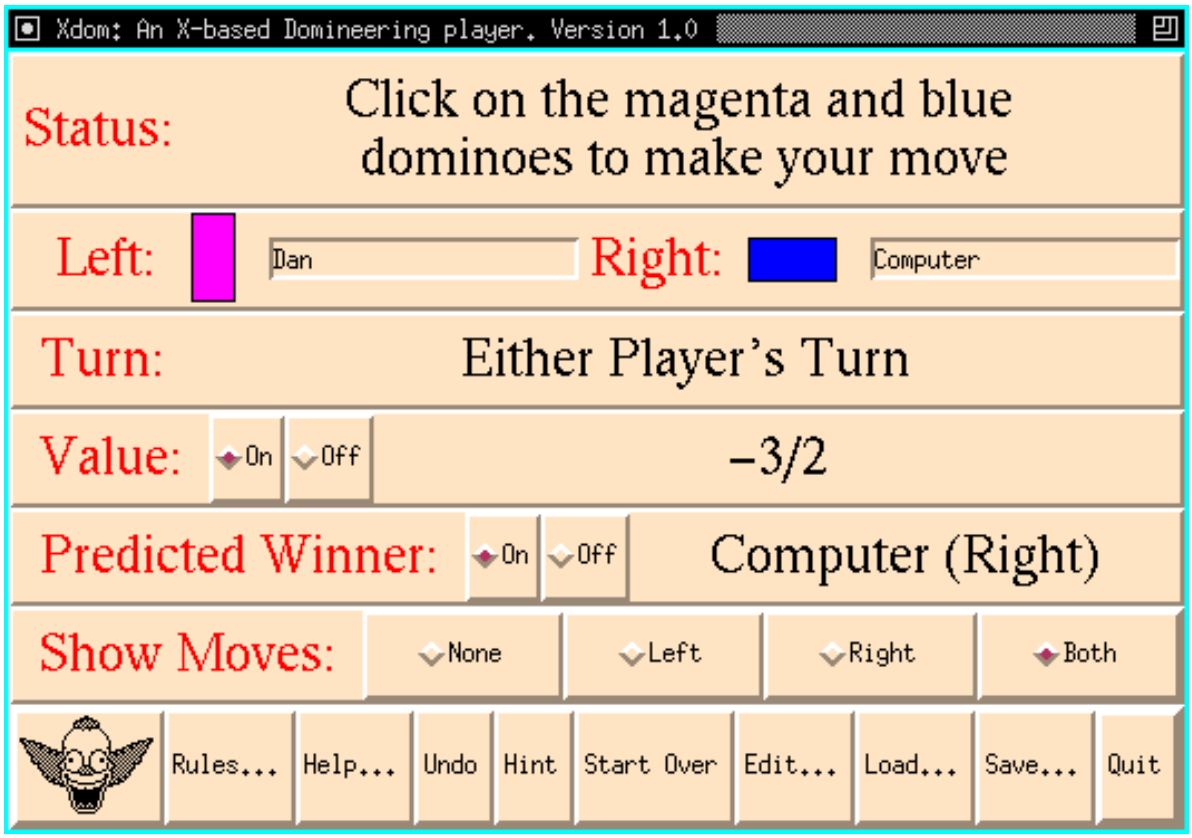

Figure 1: The main Xdom window

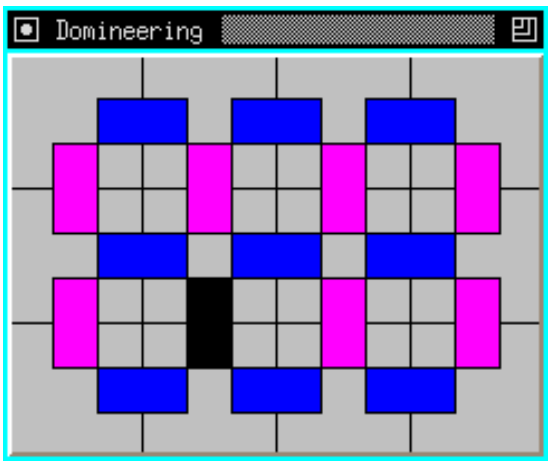

Figure 2: This is the default Domineering window

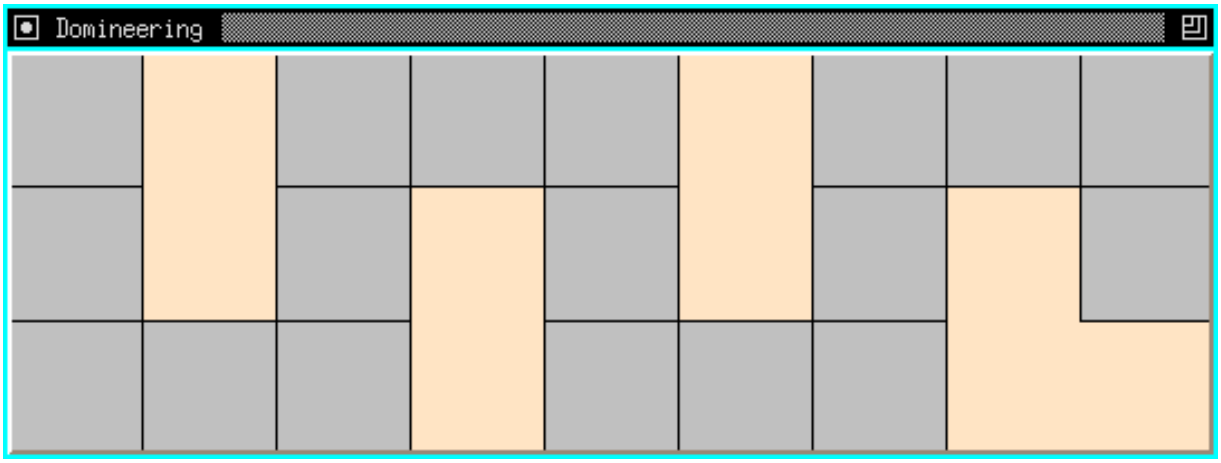

Figure 3: This is the Domineering window with "None" of the moves highlighted

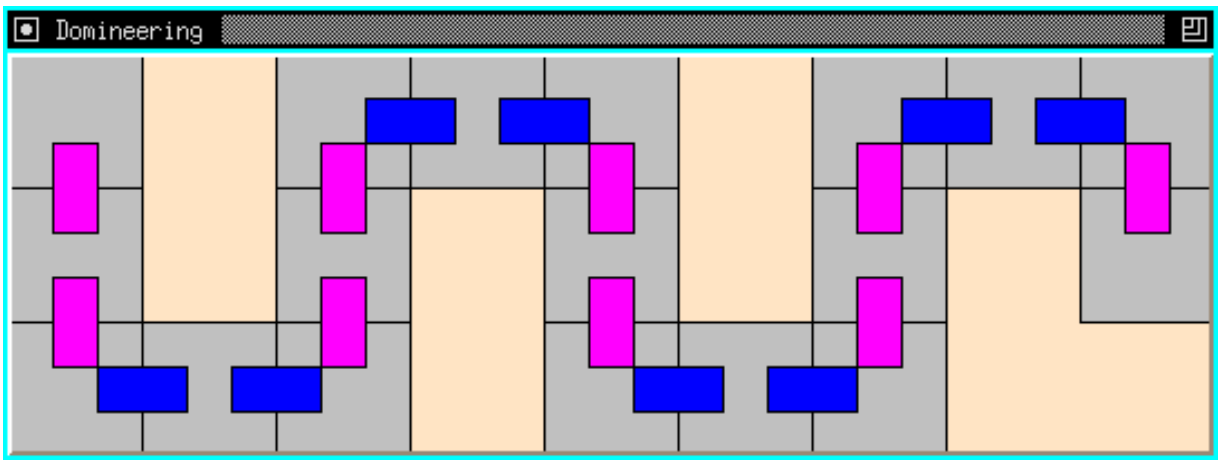

Figure 4: This is the Domineering window with "Both" moves highlighted

move, the user simply clicks on either a magenta or blue domino. These dominoes overlap exactly two of the grey slots, and whichever two slots they overlap are the slots that are chosen by the user.

At any point the user may wish to view the moves available only to left, the moves available only to right, both or neither. This is supported, and all the user must do is click on "None", "Left", "Right" or "Both" in the "Show Moves:" area.

Once the user has clicked to indicate the move, several things happen. First, the two slots disappear (since they are now filled with a domino) and all of the moves that are now rendered invalid due to the move are also removed. Then the program calls the `games` program to find the value of this new game and who should win. This value and the prediction are added to the "Value:" area and the "Predicted Winner:" area in the main Xdom window.

If a Left move was chosen, the system assumes that Right will play next and automatically highlights only Right's moves. It also changes the value of the "Turn:" field to be whatever name was in the "Right:" entry field. The program operates similarly if a Right move was chosen. However, if the user wishes to play two Left moves in a row, the user simply clicks "Left" from the

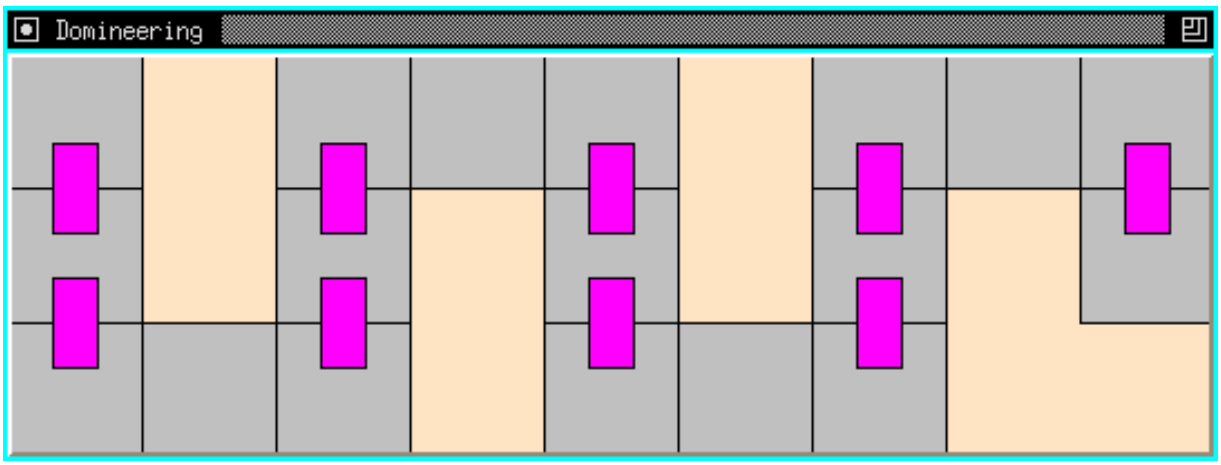

Figure 5: This is the Domineering window with only the “Left” moves highlighted

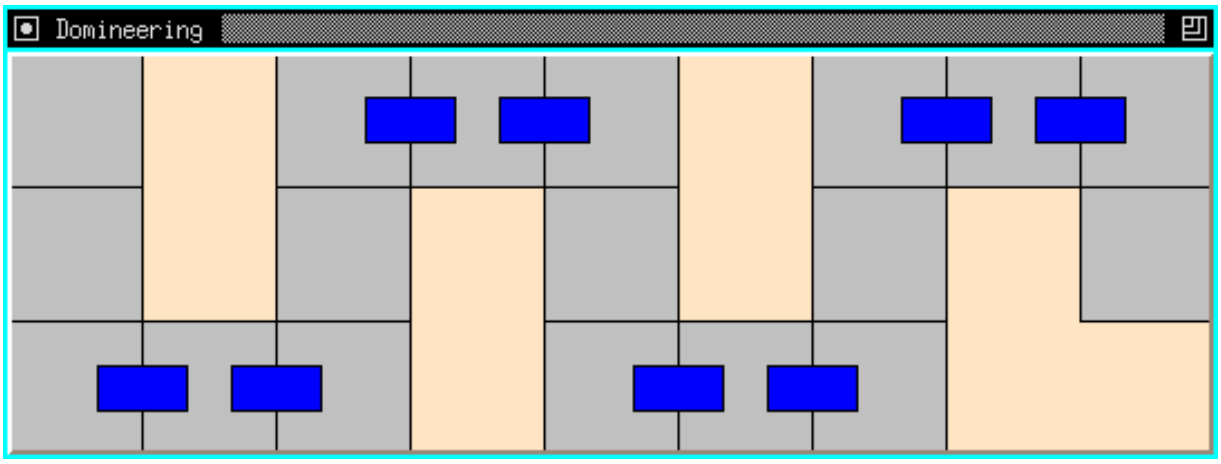

Figure 6: This is the Domineering window with only the “Right” moves highlighted

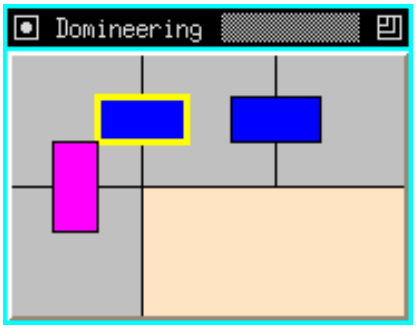

Figure 7: The Domineering window with the highlighted Left move

Figure 8: The dialog box which requests the size of your new Domineering board

"Show Moves:" area and the Domineering and "Turn:" windows are updated with the moves for left and left's name.

3.2 Hints

Hints (best possible moves) may be indicated at any time. To show a hint, the user would click the "Hint" button. If the "Show Moves:" option was set to "Left", then only the best of Left's moves are considered, and similarly for Right. If "Both" moves were being shown, then the best moves for both Left and Right are highlighted. If "None" is selected from "Show Moves:" then the Hint button is disabled.

Hints can be used to simulate a computer opponent. The user simply makes a move, then selects "Hint" to determine the move to make for the computer opponent. In this fashion, the user can "get a feel" for optimal strategies at various positions.

3.3 Editing positions

Users may wish to experiment with creating their own Domineering positions or editing existing positions. To do this, the user would simply click the "Edit..." button and a dialog box would come up requesting the size of the new Domineering board. After specifying the new sizes, the user can either have the current board or a blank board loaded into the editor.

Once inside the editor, there are two editing modes: single-toggle-click and drag-mode. In single-toggle-click, the user clicks with the left mouse button on a slot to either select it or unselect it. This is a toggle, so clicking twice toggles the selection status back to its initial status. Selected

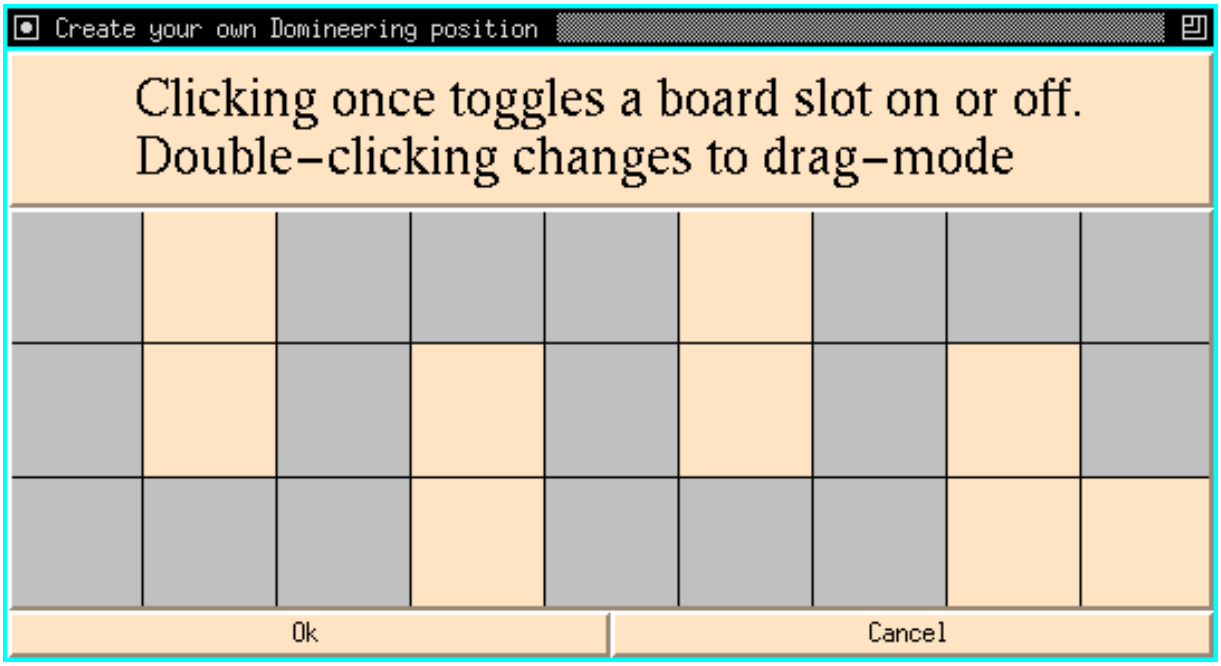

Figure 9: This allows a user to create a new Domineering board

slots are grey, unselected slots are off-yellow.

If the user double-clicks, the system goes into either drag-select-mode or drag-unselect-mode, in which the user simply drags the cursor over slots, and they will either be all selected or all unselected. Which mode the system goes into depends on the status of the slot which contained the cursor when the user double-clicked. If the initial slot was was unselected, then the system goes into drag-select-mode, and vice-versa.

3.4 Loading and Saving positions

Any position may be saved to a file or loaded from a file. The dialog boxes for "Load..." and "Save..." are almost identical, with the exception being the "Inspect" button with the loader. The inspect button allows the user to inspect the contents of the file without loading the file into Xdom. To change directories in these dialog boxes, the user simply double-clicks on the directory of interest, and the system will change to that directory and display its files. To load a file, the user can either double-click on the filename or single-click on the name to select it, then hit the "Load" button. When saving, the user simply clicks the cursor in the "Filename:" field to insert the cursor, then types the name of the file they wish to save as, then clicks the "Save" button. If the user inadvertently forgets the `.dom` suffix, the system automatically appends it.

Domineering files may also be created in a favorite text editor - they are simply ASCII files. However, these files must have a strict format, but it is quite simple nevertheless, and described in the following section.

Figure 10: The "Load..." dialog box

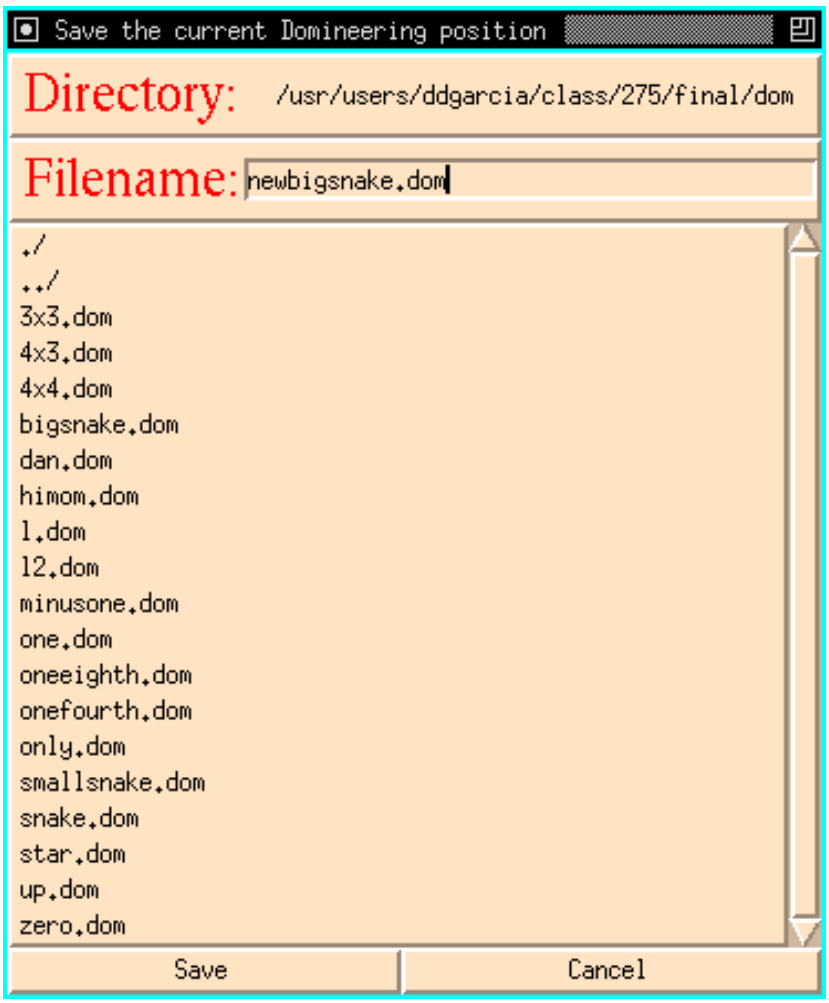

Figure 11: The "Save..." dialog box

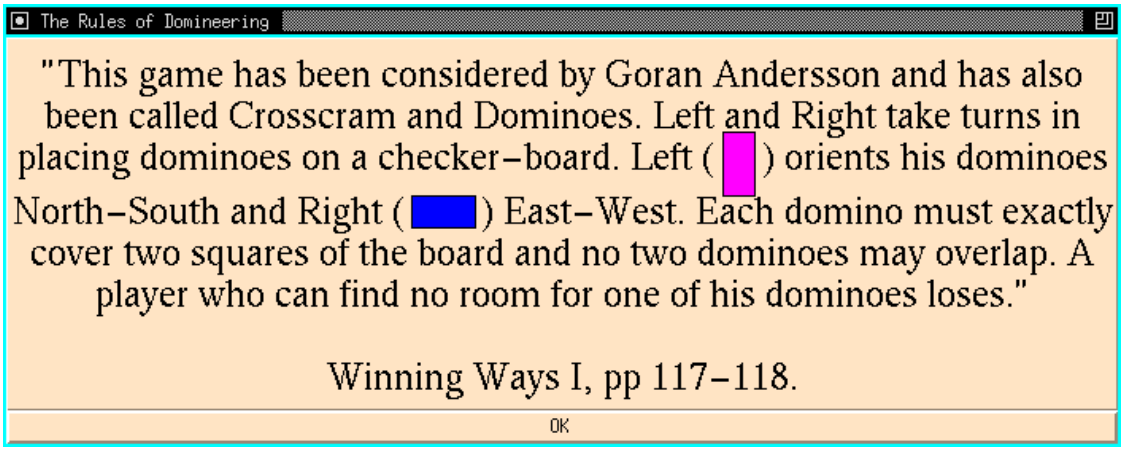

Figure 12: The "Rules" dialobg box

3.4.1 Format of Domineering files

There are only two requirements for Domineering files. First, the filename must end in `.dom`. This is because the "Load..." dialog box only lists files which are matched with the regular expression `*.dom`. This is quite useful as users don't have to weed though a large directory in order to find their `star.dom` file.

The second requirement of the Domineering files is that the first line contain only the word "dom", and the following lines contain nothing but two types of characters: spaces to specify the blank slots and a particular character to specify the filled slots. This is the format that the `games` program requires. Below is a sample `.dom` file.

```
dom
* *** ***
* * * * *
*** ***
```

3.5 The Rules of Domineering, the About box and Help

The user can find out the rules of Domineering by clicking the "Rules..." button, which brings up a large window containing the rules. The user can also bring up an "About" box (by clicking the clown's face) which displays information about the author and briefly describes Xdom. If the "Help..." button is selected, a new window is created containing online help for the user.

4 Conclusion

This document described all of the features of Xdom, as well as provided screen shots of many of the important user-interface windows. Xdom owes much credit to `games`, since remote procedure calls were sent to this program to calculate the value and the predicted winner. Xdom allows full interaction with the game of Domineering and can be a useful teaching/analysis tool.

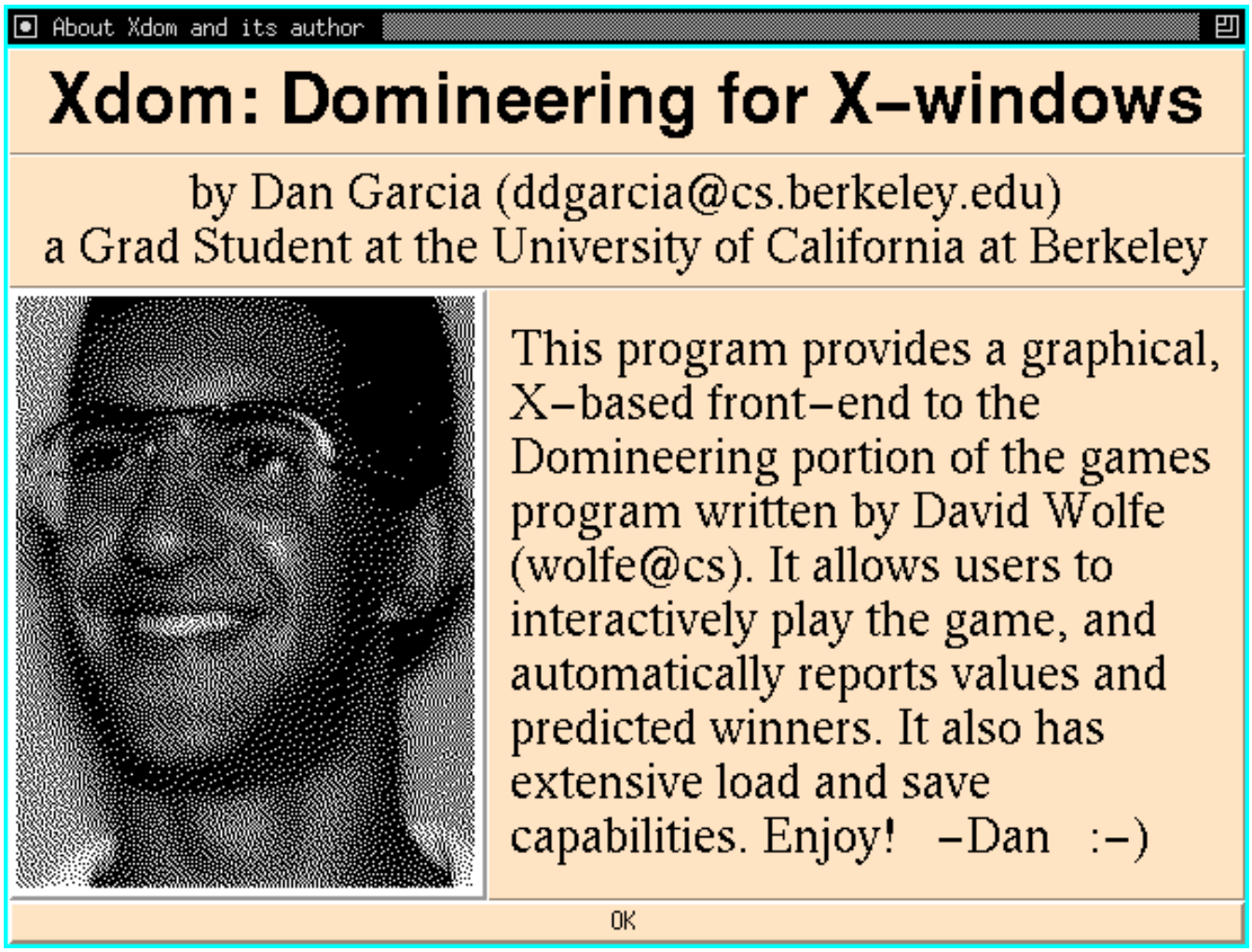

Figure 13: The "About" dialog box