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| This tutorial was written By Andy at www.dolewalla.com. He wrote it for his book on gmax. But the publisher made him dump it because "Its too technical for mappers", so he withdrew this chapter (and 5 others). He's teaching mapping for UT2K3 at Art Institute of California, Los Angeles.  **In this Tutorial**   * Overview * Installation   + Game Installation   + Editor Installation * Tour of the Interface   + Views   + Zoom   + Pan   + Selecting Objects   + Moving an Object   + Rotating an Object   + Camera View   + Textures View   + Grids * Creating a Simple Level   + Creating Geometry that Bounds the Level   + Moving Edges   + Using CSG Hollow   + Texturing Surfaces   + Sky Texture   + Adding a Player Start Position   + Creating Weapons   + Creating Breakable Crates   + Lighting the Scene   + Compiling the Level     - Compiling from MOHRadiant     - Compiling manually   + Play Testing a Level   + Debugging * Improving the Level   + Creating a Building   + Creating a Rotating Door   + Window Opening   + Creating the Window   + Roof   + Gable   + Arches   + Distorting Brushes to Create Rounded Geometry   + Clipping an Object   + Creating Patches * Summary   **Overview**  The concept of this chapter is to get you to a place where you have overcome most of the major hurdles inherent in creating a Medal of Honor (MOH) level.  Radiant is an excellent level editing tool. Originally Radiant was built for use with Quake, now there are many flavors of Radiant, the one used for this chapter is MOHRadiant. The exercises in this chapter lead you through creating a simple level demonstrating the fundamental features of the editor to create basic, essential objects. Use the techniques learned through doing the exercises as a foundation to your knowledge of Radiant. Remember, Radiant is a leading game editor used in many prominent games such as Soldier of Fortune and Return to Castle Wolfenstien, Jedi Knight II, and Quake III Arena.  In this chapter the exercises show how to create a boundary ‘shell’ to define the extents of a level, how to create objects inside the boundary, how to texture the objects, and then gives an introduction to lighting. The compiling process is introduced as early as possible so you can test the level.  The exercises in this chapter are not going to lead you through creating a finished level, but they do show how to create all of the main features of a level. You can then use these features to create your own design of level. If you want to play an example of a level made with these techniques, copy the file mohlevel1.bsp from the \chapter12 folder on the CD-ROM into your Medal of Honor maps folder and then load it from the console inside the game.  **Installation**  **Game Installation**  You must install the Medal of Honor game into a folder named without spaces. This chapter uses the game folder name c:\moh  **Editor Installation**  You must also install the MOHRadiant editor into a folder without spaces in the name. This chapter uses the folder name c:\mohaatools  Download and install the Medal of Honor level editor:   1. Download the latest version of MOHRadiant software from the official Medal of Honor web site at http://mohaa.ea.com/ 2. The file comes as a .zip file. You can extract this file to any folder you like as this just extracts the installation program. 3. In the extraction folder, you will find a program called MOHAATOOLS.EXE. This file is another compressed file, but in a self-extraction format (Rar). Double clicking this file begins the extraction and installation process, part of which asks which folder the files should extract to. You should extract the program to a folder structure that has no spaces in the name. Do **not** use the default folder (\Program Files\MOHAATools) for extraction.   https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/note.gifAt the time of writing this, the process that converts (compiles) your level into a game readable format (.bsp files) cannot read folder names that contain spaces. Both the editor and the game folder name cannot contain spaces.  **Summary**  One folder c:\moh contains the game executable mohaa.exe. Another folder c:\MOHAATools contains the editor.  **Editor Configuration**  Before you can configure the MOHRadiant editor, you must copy an Entity Definitions file into the \main folder underneath the games folder. This file contains data about entities (weapons, player start positions, etc) so you can create them in a map:   1. With the extraction of MOHRadiant came a file called entdefs.pk3, locate this file. Copy it to the folder called \main under the folder containing your MOH.exe executable file. Our folder name is c:\moh\main. 2. Under the \moh\main folder, create a new folder called maps. The editor expects to find this folder to autosave your maps. If you don’t create this folder you will get an error message as shown in figure 12.1.   https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/12_004.jpg Figure 12.1. Cannot autosave to the \maps folder. 3. Launch the editor (mohradiant.exe) from its folder and enter the information asked for. If you want to change the information later open File/Project Settings from the main menu in the MOHRadiant editor.   If you run into problems using the editor you may need to edit the MOHRadiant configuration file *default.qe4*. MOHRadiant uses this file to find the folders for files that it uses. The self-extraction file places default.qe4 into the same folder as the editor.  https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/note.gifMOHRadiant uses an external program, q3map.exe, to compile your map, default.qe4 must point to the folder which contains this file.   1. Look in the folder that contains mohradiant.exe, use Notepad to open the default.qe4 file from this folder. 2. Look at the contents of a default.qe4 file as shown below, change i:\moh to your Medal of Honor root folder (the folder where moh.exe is).   {  "brush\_primit" "0"  "basepath" "c:\moh\"  "rshcmd" ""  "autosave" "c:\moh\main\maps"  "mapspath" "c:\moh\main\maps"  "remotebasepath" "c:\mohaatools"  "modelmask" "\*.tik"  "entitydir" "code/"  "moddir" "main"  "bsp\_BSP" "! q3map -v -gamedir ../moh/ $"  "bsp\_Vis (fast)" "! q3map -vis -v -fast -gamedir ../moh/ $"  "bsp\_Vis" "! q3map -vis -v -gamedir ../moh/ $"  "bsp\_Light (fast)" "! mohlight -v -fast -gamedir ../moh/ $"  "bsp\_Light" "! mohlight -v -gamedir ../moh/ $"  "bsp\_Light (final)" "! mohlight -v -final -gamedir ../moh/ $"  }  https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/note.gif  The folder name directly after the parameter -gamedir (in the line "bsp\_BSP" "! q3map -v -gamedir ../moh/ $") points to the folder that contains your game executable (mohaa.exe). This link is relative to the folder that contains mohradiant.exe.  -v means verbose response, ‘tell me everything’, responses are sent to the console which you can open and close by pressing the o key while in the editor.  -moddir the folder where mods are kept, not used in these exercises.  **Project Settings**  Taken from the Radiant Manual.  **Basepath:** This traces a path, beginning in your root directory to the baseq3 where the editor expects to find resources.  **Mapspath:** This traces a path, beginning in your root directory, to the location where maps are saved and from which they are loaded. The default is the maps directory.  **Rshcmd:** This means "remote shell command." Use it only if you are directing a remote processing device (not your editing computer) to compile maps. The syntax for the field is: "rsh [processor name]"  **Remotebasepath:** If you are running your compile from your editing computer, this should be the same as your basepath. If you are working off a remote compiling device, this should trace the full path to the to the baseq3 folder where the compiler will find the resources it requires.  **Entitypath:** This traces a path to the definition file for your game entities. This can either be a .c file which contains the game code, or a .def file which contains more instructive information about the entities.  **Texturepath:** This traces a path, beginning in your root directory, to the location from which textures are loaded. The default is the textures directory.    **Tour of the MOHRadiant interface**  **Views**  https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/12_029.jpg Figure 12.2. The MOHRadiant interface.  Figure 12.2 shows the entire interface. When you launch MOHRadiant you are presented with one large View in the center the Top view looks down at your map, a tall thin view on the left lets you change heights. Two panels on the right, the upper panel is the Camera view, the lower panel is the Texture view. You can resize the views by dragging the bars between them and you can change the views from the View main menu if you choose Layout.  Alternatively, you can cycle the Top view through Side, Front, and back to Top view by clicking the Change Views icon in the main toolbar. Figure 12.3 shows the icon.  https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/12_006.jpg Figure 12.3. The Change Views icon.  **Zoom**   * Mouse wheel zooms in or out. * Insert Zooms in * Delete Zooms out   **Pan**   * Right click and drag.     **Selecting Objects**   * Hold the Shift key down and click an object to select it. * Shift click to de-select an object. * Escape to de-select all objects. * Backspace to delete a selected object   **Moving an Object**   * Select an object, then click and drag from inside the selected object to move it. * Clicking and dragging from outside an object moves the nearest edge.   **Rotating an Object**  The rotate icons in the rotation and mirror toolbar (Figure 12.4) rotate objects 90 degrees at a time.  https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/12.jpg Figure 12.4. Rotation and Mirror toolbar.   * Use the rotation icons for 90 degree object rotations.   The trick to understanding the rotation direction is to know that the x axis is horizontal. The label on the view tells you the vertical axis. Therefore, if you rotate around the x axis, the top of the object will come up toward you.  https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/note.gifThe rotation group of icons also contain icons (the ones with the red bars) used to mirror an object.  90 degree rotation example:   1. Select an object in the Top (XY) view. 2. X is horizontal, Y is vertical, so Z must come out of the screen toward you. So click the z-axis rotate icon to rotate the object clockwise by 90 degrees.   15 degree rotation example   1. To rotate an object in 15 degree increments press r on your keyboard, the object should turn purple. 2. Click and drag to rotate the object around an axis perpendicular to the view. To rotate the object around another axis, change the view. 3. Press r to turn rotation off.   https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/note.gifOpen Preferences from the Edit main menu to change the rotation increment.  **Camera View**   * You can use the right mouse button to click and drag in the XY Top view to rotate the camera. Alternatively, use the arrow keys to rotate and move the Camera view. * For an easier time moving and rotating the camera view, click the eye icon at the far right of the main toolbar. Then you can use the right mouse button to rotate the view and the arrow keys to zoom. Click the eye icon again and you get a second way of using the camera view. * The letters c and d on your keyboard move the camera down and up respectively.   **Textures View**   * Right click and drag to move the texture window up.   **Grids**  The horizontal and vertical grids in each of the 2D viewports can change spacing when you zoom a view. When creating geometry, you should try to keep corners and edges on the grid intersections. When you design your initial level layout bear in mind that 16 units represents 1 foot, so a grid size of 16 units lets you create geometry accurately if you count grid lines.   * Open the Grid main menu and choose a grid snap size, figure 12.5. * Alternatively, press a number on your keyboard to change the size.   https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/12_036.jpg Figure 12.5. Grid snap sizes.  Changing the grid value in the Grid main menu changes the Grid Snap not the spacing of the displayed Grid. The size that you choose determines the incremental size of the objects that you make. If, when you create an object its edges don’t appear to lock onto a grid intersection then the Displayed grid spacing is not the same as the grid snap size.  **Creating a Simple Level**  Half the battle with many level editing programs is in configuring, successfully compiling and testing a level. After you achieve these seemingly insurmountable hurdles you will find that you start to have fun winning the other half of the battle in creating the geometry of the level.  The exercises in this chapter lead you through the process of creating some of the more interesting features in a game level. You create the boundary of a simple level, texture it, add lighting, and make a start position for a player, major geometry and entity types available in MOHRadiant. Additional exercises include lighting and texturing objects.  **Creating Geometry that Bounds the Level ( a sky box )**  You must make a ‘shell’ from geometry with no gaps or overlaps to surround your level. Six brushes in a box formation is a classic and simple way to achieve this. Later, when you gain more experience you can experiment with more interesting boundary shapes, but for now, this tutorial illustrates a six-brush border. The CSG Hollow tool, with one click, lets you create six brushes from a single brush. This will ensure that the map does not ‘leak’, a leak occurs when there is a gap in the boundary shell, see the section on debugging.  **Note:**   * The Grid Snap setting determines the thickness of the brushes made by CSG Hollow. * As you create the object, watch the dimension and position readouts at the bottom of the screen. * Create the base below zero level, then, when you use CSG Hollow tool the top of the base will be on zero level.   Follow the steps to create a box style boundary for the level (don’t worry too much about accuracy the subsequent section deals with changing an objects size):   1. Use your mouse wheel or press the Insert and Delete keys to zoom the Top view until you can see grid dimensions of at least -1024 to 1024 vertically. 2. In the Grid main menu choose Grid 64. The edges of objects that you draw will now snap to increments of 64 units. 3. In the Top view, click and drag to draw a brush from -1024,-1024 to 1024, 1024. Watch the bottom of the interface for a readout of your cursor position. After you click and drag you should see a red rectangle in the Top view. 4. If you missed the exact positions press Backspace to delete the object, try it again. 5. Click the Change Views icon (it has XYZ in it) in the main toolbar to change the XY Top view into the XZ Front view. You are now looking at the front of the ‘building’. 6. To make the brush taller, place your cursor above the top edge (not on the edge), click and drag to move it to a height of around 512 units. 7. Click and drag the bottom edge of the brush until it sits 64 units below the horizontal 0 line. 8. Save the file to avoid the error message shown in figure 12.1.   https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/note.gifWith the camera inside a solid box, the camera view displays nothing. Move the camera so that you can see the box from the outside.  **Moving Edges**  Just in case you had difficulty making the exact size of the brush in the previous section, move the edges of the brush to get the size. Moving a brush edge to re-size the brush is a common procedure. The main trick to remember is not to click and drag with your cursor on the edge, rather you must click and drag from outside the edge.  Follow the steps below to fix the overlaps:   1. Make sure your box is selected, bright red shows selection. 2. Use Change Views to go back to the Top view. 3. Place your cursor on the right of the right edge. 4. Click and drag to move the edge of the brush. 5. Size the brush to so the corners are at -1024, -1024 at the bottom left, and 1024, 1024 at the top right.   **Using CSG Hollow**  The Hollow tool replaces each side of the original brush with a separate brush. Each new brush takes its thickness from the Grid Snap setting, in this case 64 units. However, the new brushes take their length and width from the sides of the original brush, which means that the brushes overlap at their edges. This is not good, although the level will compile without error messages get into the good habit of re-aligning edges after you use the Hollow tool or avoid Hollow altogether and draw the brushes yourself.  Perform CSG Hollow and then fix the overlapping edges:   1. Change back to the Top view. 2. Open the Grid main menu and choose Grid 64, (shortcut key 7) – just to confirm the 64 unit grid snap setting. 3. Open the Selection main menu, choose CSG from the list and then choose Make Hollow. The single brush converts to six individual brushes as shown in figure 12.6. Fly around the inside of the boundary in the Camera view to check it out.   https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/12_040.jpg Figure 12.6. Top view of a hollowed brush. 4. Press Escape to deselect all brushes. 5. Shift click to select the top brush (in the Top view). Note that shift click selects the nearest brush. 6. Place your cursor to the left of the left edge. 7. Click and drag one grid space to bring the edge in toward the center. 8. Place your cursor below the lower edge, click and drag to move the edge in one grid space toward the center. 9. Repeat with the other two edges. 10. Press the h key on your keyboard to hide the selected top brush. 11. Hold the Shift key down and click in the center of the objects in the Top view. This selects the brush on the bottom, drag the edges inward one grid space as you did for the top brush. Press h to hide this brush. 12. The walls also overlap. Select and hide the side walls, then reduce the width of the remaining two walls by 64 units. 13. Hold the Shift key down and press the h key, this sequence (Shift + h) unhides all hidden objects.   https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/note.gifIf your object comes off the grid, press Control + g to put it back on the grid intersections.    **Texturing Surfaces**  Texturing is the process of assigning one or more bitmaps to the surfaces of objects in your scene. It makes sense to apply an appropriate picture for a surface, for example a picture of bricks to go on a wall. Because MOH mostly uses box shaped brushes, the MOHRadiant default is to apply six copies of the texture as if the object were a box, even if it is not box shaped. However, this increases rendering time in game.  The players in your level will never see the surface on the outside of the boundary brushes. Wherever a player cannot see a brushes face, you should apply a Caulk texture to that face. Or, as in the case of the Boundary brushes, apply a Caulk texture to the entire brush and a normal texture to the inside face. A Caulk texture is a special bitmap that tells the compiler not to include that face in the game, thus making the game play faster. If you don’t use the Caulk texture, the number of hidden faces in your level may slow the gameplay until the players become frustrated and leave the level. One strategy you might use is to apply Caulk textures as the default when you are creating objects and then apply textures to just the visible faces. You are more likely to see and fix a Caulk texture than you are to Caulk a hidden surface. Actually, almost every object in your scene has some sides that the player cannot see.  Try it out, apply the Caulk texture to the boundary objects, and then choose textures for the visible sides:   1. Hold the Shift key down, click all brushes in the scene. 2. Open the main menu Textures, choose the common category. The textures in this category should load into the texture display panel at the lower right of your screen. 3. Right click and drag the texture panel up, find the Caulk texture as shown in figure 12.7, and click it,. The texture should appear on every side of the selected objects as shown in figure 12.8. If everything is too dark to see, open the View main menu choose Lighting and turn Real Lighting off.   https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/12_002.jpg Figure 12.7. Caulk bitmap in Texture view.   https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/12_041.jpg Figure 12.8. Caulk Texture applied to all objects. 4. De-select the objects by pressing the Escape key. 5. Hold the Control and the Shift keys down, in the Camera view click on the brush at the bottom of the scene (the ground brush). Only one side of the brush turns to the red selection color. 6. In the Textures main menu, choose the *..* item to return to the texture categories. 7. Choose the misc\_outside category from the Textures menu. Scroll through the texture window and find one that you like for the ground, click the bitmap to apply it to the selected face. 8. To force the picture to stretch to the size of the selected face, click the Fit button at the bottom of the interface.   Inside the boundary you should see your selected bitmap on the ground, if you fly your camera outside the boundary brushes you would see the Caulk texture on the faces underneath the ground brush as shown in figure 12.9.  Figure 12.9. Caulk Texture on the outside of the objects.  **Sky Texture**  To create the appearance of a seamless sky, apply a sky texture to the top and side brushes. The specially created textures from the Sky textures category in the Textures main menu create the appearance of a continuous sky around your level. As in the last section only select and apply bitmaps to the inside faces.  To create a sky:   1. Press the Escape key to deselect any selected objects. 2. You may find it easier to select faces from the Camera view, use right click and drag in the Camera view. Hold the Control and Shift keys down, click every brush except the one on the floor. 3. In the Textures main menu choose .. to go back to the categories as shown in figure 12.10, scroll the list of textures, choose Sky from the list. 4. Right click and drag the Textures panel until you see a sky texture that you like, click the texture to apply it to the faces of the selected objects.   https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/12_039.jpg Figure 12.10. Texture main menu.  **Adding a Player Start Position**  Every level requires at least one player start entity. You must place the entity in a valid position inside the bounding boxes, if the entity is inside or touching a brush the player may not be able to move when he enters the level.  https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/note.gifDepending on how your computer is set up, you may need to right-click twice to create an entity.  Follow this sequence to create a player start entity:   1. Press Escape to deselect all objects. 2. Right-click in the center of the Top view, choose *info* from the list. 3. In the info panel choose *player*, in the player panel choose *start* as shown in figure 12.11.  https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/12_028.jpg Figure 12.11. Player Start. 4. Click the Change Views icon to change the main view to a front or side view. 5. Move the player start entity so its lower edge is on the top of the ground brush. Change the grid snap if you need to. 6. Press n to bring up the Entity window. In this dialog you can change attributes of the selected entity. 7. In the white key panel next the name Key, type in angle. 8. Press the Tab button to move to the white Value panel, type in 180 and press the Enter key. The key name *angle* and its value should appear in the white information panel. The angle specifies the direction that the player will face when he enters the game. 9. Press Escape to deselect the player start entity.     **Creating Weapons**  Although your basic room will compile and play without a weapon, you might feel vulnerable without one. Weapons are in a list of Entities, which you can bring up by right clicking in a 2D view. Just choosing an entity from the list will create the object in the scene. You can fly around in the Camera view to look at the object fully rendered. We will meet several types of entities as the tutorial progresses.  Follow the steps to add a Weapon entity to your scene:   * 1. Deselect all objects by pressing the Escape key on your keyboard.   2. Right-click on somewhere inside the boundary.   3. Choose Playerweapon, a category opens so that you can choose Allied or Axis weapons. Choose one category and weapon from that category.   4. You may need to move or rotate the weapon. Checkout the object in the Camera view, figure 12.12 shows a Camera view of a Colt 45.   https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/12_010.jpg Figure 12.12. Colt 45.  **Creating Breakable Crates**  Crates have many uses, you can use crates to hide items, you can place items on them, and you can use them for climbing over objects. Indestructible crates are just boxes, but you can assign a crate as breakable and set a strength value which determines how hard you must try to break the crate.  Follow these steps to place a breakable Crate entity in your scene:   1. Press escape to deselect all objects. 2. Click and drag to draw a crate size brush. 3. Press n to open the Entity dialog window. 4. Scroll through the list in the Entity types panel, double-click the Entity type func\_crate as shown in figure 12.13. The attribute name func\_crate appears next to the object name on a correctly assigned entity. 5. Open the Textures main menu and choose a suitable material for the crate. You might find something suitable under *German* or *das\_boot*.   https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/12_031.jpg Figure 12.13. Crate Entity.   **Lighting the Scene**  You must light the level so your player can see where he is going. Lights come under the category of Entities, and each type of entity that you make has specific attributes associated with it that you can change, for example a light would have an intensity value assigned.  The default type of light in MOH is an omni-directional light. This type of light shines out from a point source illuminating everything within its path. The light travels a distance of 300 units unless you change the Entity value key *light*.  Create lights in each corner of the level:   1. Right click on the Top view, choose Light from the entity list. 2. Click and drag the light into one corner of the scene. 3. Press the n key on your keyboard to open the Entity dialog. 4. In the Entity dialog, in the white panel next to the word *Key* type in light. 5. In the white panel next to the word Value type in 2000 and press the Enter key. The key word light and its value should appear in the white information panel and the red radius showing the travel distance should display in the 2D views. 6. Press Escape to deselect. 7. Right click in the scene, create another light. 8. Move this light to another corner of the room. 9. Create lights for the other corners of the level, as shown in figure 12.14. Change their light values so that the entire scene is covered by lights but try not to let them overlap too much or hotspots will appear. 10. In the Front and Side views make sure that the lights are inside the main walls, move them if you need to. Use the Camera view to check the positions.   https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/12_005.jpg Figure 12.14. Lights in corners of boundary.  https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/note.gifMake sure you de-select all objects before creating an entity.  The explanation for the key parameters gives the light parameter as intensity, however the light parameter is the distance traveled for the light. You will see an outer radius shown as a red circle that indicates distance that the light covers. The default value for the parameter light is 300, changing the parameter and pressing Enter will increase the radius of the circle and travel of the light.  **Compiling the Level**  The previous sections are slightly more than the minimum required before you can compile and player test a level. The crate and weapon are not strictly necessary, the texture is not required either but the Caulk texture would break the compile.  Although you can use the editors built in commands for compiling they often cause problems and their features are largely undocumented so deciphering the commands is difficult. The alternative to using the built in commands is to write the command out in a command window, both methods are shown below.  **Compiling from MOHRadiant**  Compiling involves invoking programs from the BSP main menu. The main program is bsp\_BSP which changes the map file into .bsp type game readable format. The second command that you call, bsp\_Light (Final) calls up the MOHLIght program and creates the lighting for the geometry.  Compile the level using compile commands from the BSP main menu:   1. Open the File menu and click Save, type in a name the first time that you save the level. The file is stored in the \main\maps folder under the game executable folder. 2. Open the BSP menu and choose bsp\_BSP. 3. Open the BSP menu again and choose bsp\_Light (Final)   These programs use the information stored in default.qe4 to find folders. If any problems occur using the compile programs, open default.qe4 with a text editor and change the settings. The information in the section about installing the Editor at the beginning of the chapter should help you with this configuration along with the following:  You can configure the bsp compile programs if you open the Project Settings from the File main menu, highlight the bsp\_BSP name then click the change button as shown in figure 12.15.  https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/12_020.jpg Figure 12.15. Changing a bsp command.  Clicking the Change button brings up the dialog shown in figure 12.16.  https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/12_007.jpg Figure 12.16. Changing the bsp\_BSP compile command.  The line that you see in the command area is essentially the same as the command that you create in the following section on compiling manually. You could change this command to a fully manual command which would work around any folder errors that occur with the original command. Changing the command might look like figure 12.17.  https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/12_026.jpg Figure 12.17. Changed command line.  One reason why the original command line may not work is that it creates a batch file and but cannot run it from its current folder. The batch files, sent to your Windows temp folder are shown at the top of figure 12.18 – qe3bsp2.bat and qe3bsp.bat.  https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/12_014.jpg Figure 12.18. Batch file saved by the compiler command in MOHToools.  The junk.txt file that you see near the top of the files shown in figure 12.18 contains the result from using the –v option when running the batch files. If you open it you will see the compiler output. The output looks similar to the one shown in figure 12.19.  https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/12_034.jpg Figure 12.20. All is great.  If however, you see something similar to figure 12.20, then the compiler did not work.  https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/12_023.jpg Figure 12.20. Compiler error.  https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/note.gifThe output shown in figure 12.20 results when the compiler command calls the q3map program from an incorrect folder.  **Compiling manually**  Compiling manually is easy and gives you the most control. The command line that you enter in a Command Prompt window is global, you only need to change the name of the map to compile any map.  Try it out:   1. From your Windows Start menu, choose Programs and then Accessories, from the Accessories list choose Command Prompt as shown in figure 12.21.   https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/12_024.jpg Figure 12.21. Invoking the Command Prompt. 2. Figure 12.22 shows the Command Prompt window that opens.   https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/12_025.jpg Figure 12.22. Command Prompt window. 3. A command typed in would look like the following :  c:\mohaatools\q3map –v –gamedir c:\moh c:\moh\main\maps\simpleroom 4. The window should look like figure 12.23. Press enter to run the command after you type it in.   https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/12_008.jpg Figure 12.23. BSP Compiler command.   Explanation of the command line  **C:\mohaatools\q3map** – calls up the q3map compiler program from the mohaatools folder on the c drive.  **-v – A q3map** option that writes out the result of the compiler (figure 12.24 shows one correct result).  **-gamedir c:\moh** – Tells q3map in which folder the game executable (mohaa.exe) resides.  **C:\moh\main\maps\simpleroom** – The folder and name of the map. It is not necessary to put the .map extension on the end.  https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/note.gifThe command is not case sensitive, but you must put the spaces in the correct places.  A batch file is a text file that runs instructions from the command prompt. You could of course, use a text editor to create a batch file with this line and then just run the batch file from Windows. Do this if you know how and you can just change the name of the map. The disadvantage of this method is that you will not see the –v (verbose) output from the batch command.  Running the batch command on the room made in the exercises results in a great long stream of information some of which is shown in figure 12.24.  https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/12_018.jpg Figure 12.24. Verbose output from compiler.    **Play Testing a Level**  You should play test your level at every stage that you can. When you see the scene through the players eyes you may want to change things around to improve them.  Play test the progress on your level:   1. Launch Medal of Honor. 2. Open up the Options screen, choose Advanced. Click the Console checkbox to enable the console in the game. 3. Return to the Options screen. 4. At the options screen, before you enter a game, bring down the console by typing ~ (the tilda key). 5. Type in the words **map simpleroom**, or the word *map* and the file name that you used to save the level.   **Debugging**  Say for one crazy minute that your level didn’t compile properly, here are a few common problems with their remedies.   * The level seems to compile but MOH cannot load the map.   + Look in the \moh\main\maps folder for the compiled names which are test.bsp and test.prt. If you find them somewhere else, copy them into the \main\maps folder. Try loading the level again.   Everything is black when you enter the level.   * + Add lights, make sure they are near enough to the walls to shine on the walls. * You can’t move.   + The player start object is below the floor, move it up in the Front or Side views until its lower edge is above the top edge of the brush where he is standing. Check this by looking at the object in the Camera view. * The compile process says there is a leak.   + A leak is a gap between the outside walls or some part of the level exists outside the boundary. A nasty red line will show up on your screen when this type of gap occurs, an example is shown in figure 12.25. To fix a leak, make sure all of the boundary walls meet each other exactly with no overlaps. Also, move all objects inside the walls.   https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/12_032.jpg Figure 12.25. Compile Leak.  **Improving the Level**  To create custom objects you can move vertices around, to create arches you can use the built in arch tool. Windows and doors you can make with CSG subtract but you also need to know how to make a functioning door, one that can move. The following exercises will build on the knowledge from the previous exercises to improve the level.  **Creating a Building**  As an alternative to using the Hollow tool, create the brushes yourself. After practice, you will find that you become fast and accurate at creating structures from brushes. Remember that 16 units in MOHRadiant represents one foot, so a good size for wall thickness might be 16 units. A player is 96 units high, you might want to make the doorway at least 128 units high.  https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/note.gifIf you are not sure if the corners of your brush are locking on to grid intersections then your grid size is too large. You need to zoom in (watch the grid coordinates) until the grid spacing is the same as the Grid Snap setting in the Grid main menu.  Create the walls of a building (in the corner of the boundary) from brushes, leave a gap for a door:   1. In the Grid main menu change the Grid Snap to 16 units. 2. Zoom out in the Top view until you can see the bottom left ¼ of the boundary. 3. Click and drag in the Top view to draw a wall approximately 512 units sideways but only 16 units down, as shown in figure 12.26. Watch the size readout at the bottom of the screen as you drag. The exact position is not important, but it is important to zoom until the spacing between gridlines shows 16 units so that you can see where the corners of the brush lie.  https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/12_017.jpg Figure 12.26. Creating a Wall. 4. Use the Change Views icon to change to the Front View. Zoom and Pan the view to find the brush if you need to. Click and drag the top edge of the brush to a height of 192. Make sure the bottom edge of the brush is on the horizontal zero line as shown in figure 12.27.  https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/12_027.jpg Figure 12.27. Front view of wall showing height. 5. Press Escape to deselect the brush. Go back to the Top view and create another wall parallel to the first brush, same width and depth, shown in figure 12.28. You will find that the brush uses the height that you set for the last brush so you don’t need to go to the Front view to change the height.  https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/12_012.jpg Figure 12.28. Second wall with gap for door. 6. Press Escape to deselect the brush.   **Creating a Rotating Door**  Doors in Medal of Honor typically swing away from the player when he presses the use key within a certain distance of the door. These doors pivot around the left or right edge of the door. The default rotating door brush made with MOHRadiant pivots around the center of the brush. To force the door to pivot around one edge you make an extra object and apply a special texture to it. Then you convert the two objects together into one functional rotating door entity. You must follow the steps of this exercise carefully otherwise, the door may rotate incorrectly.  You must apply a special texture to the Door hinge so that it does not render, and to tell the compiler to use its position as the rotation axis.  Follow the steps to create a door brush and a hinge brush as shown in figure 12.29:   1. Change the Grid Snap to 4 units. 2. In the Top view, zoom in to the gap between the walls at the right of the building. 3. Create a door brush to fill the gap that you left in the doorway, change to the Front or Side views and drag the top edge so that it fills the doorway. 4. From the Texture main menu, choose general\_structure to load some general building textures. Find and click a suitable texture for the door Brush. 5. Press Escape to de-select the door brush. 6. In the Top view, create a brush for the hinge at one end of the doorway. Make the brush just a couple of grid squares across. 7. Open the Textures main menu, click *up* to go back to the texture category list then, choose the Common category to load its textures. 8. Click the red and black Origin texture. 9. Press Escape to deselect the object. 10. Hold the Shift key down and click both the door and the hinge brush. If something gets in your way, select it then press the h key to hide it. 11. Press n on the keyboard to bring up the Entity dialog. 12. Choose func\_door\_rotating from the list. 13. Compile the level and test the door. In the game you need to press the Enter key to open the door, the hinge brush should not be visible. 14. To make the door always open away from the Player, select the door and hinge brushes and open the Entity dialog. In the Key value type alwaysaway and in the Value panel type in 1. Compile and test as always.  https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/12_013.jpg Figure 12.29. Door and Hinge Brushes.   **Window Opening**  Before you can put a window into a wall, you need an opening. A common way to make an opening is to use the CSG tool. CSG will subtract the volume of one brush from another. Look at the before figure 12.30 and after Figure 12.31 pictures. The term CSG is a little misleading, the strict technical interpretation of CSG (Constructive Solid Geometry) implies a volumetric calculation, whereas Radiant constructs discrete objects around the subtracting geometry. The compiling tools are incapable of dealing with an object that has a hole in it. The end result of this means that you must texture the resulting objects as if they were one.  https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/12_038.jpg Figure 12.30. Before CSG Subtract.  https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/12_019.jpg Figure 12.31. After CSG Subtract.   1. Create a window size brush in the Front view. 2. Move and resize the brush in the Top view so that it protrudes (sticks out) both sides of the wall at the right of the building. 3. In the Selection main menu, place your cursor over the CSG option, in the panel that opens choose the CSG Subtract Shift+u item. 4. In the Top view, zoom in to the window. 5. Press the Backspace key on your keyboard to delete the original object. The window opening should become visible.   https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/note.gifYou could use the object used in the CSG Subtract to fill the gap if you resize it.  **Creating the Window**  Several types of window are common in MOH, solid windows which are just textures placed on brushes, windows that you can see through but serve no other purpose, windows that you can see through then break but not climb through and finally, windows that you can see through, break and climb through. You create the latter two types of window not from brushes but from entities. Each type of window requires you to apply textures.  Create a see through, break and enter type window that fits the window opening that you made in the last section:   1. Change the Grid Snap to 4. 2. Zoom into the window opening in the Top view. 3. Right click on the screen to open the entity list. 4. Choose the func category and then choose window from the list. 5. Press the n key to bring up the Entity window. 6. In the Key panel type in the word window. 7. In the Value panel type in 0 and press enter. The key name and value should appear in the white parameters panel. Press n to close the Entity dialog. 8. In the Textures main menu, choose the Window category. 9. Double click one of the textures to apply it to the window entity. 10. Click and drag the center of the window object to move it into the window opening. 11. Click and drag the edges of the window to make it thinner, you should find that it snaps to grid spacing of 4 units, make the edges of the window fit in the Front view. 12. Look at the window object in the camera view, you should see something like figure 12.32.   https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/12_003.jpg Figure 12.32. Window Object.  **Roof**  One way of making a pitched roof is to make a flat box shaped brush in the Top view then move its left edge up in the Front view. You could then copy this object and flip it over to make the other side of the roof.  Create a pitched roof by following these steps:   1. In the Top view, pan and zoom in to the top of the building. 2. Change the Grid Snap to 32. You will need a grid spacing that divides the building in two. 3. Click and drag to draw a brush that covers half of the building. 4. Change to the Front view, hold the Control key down then click and drag the left edge of the brush up. 5. Press the space bar to make a copy of the object. 6. Look in the main toolbar for the Flip Selected Brush in the X Axis icon and click it to mirror the brush sideways. 7. Move the object so that it matches the original roof object. The final effect should look like figure 12.33. 8. Press the escape key to deselect all objects.   https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/12_021.jpg Figure 12.33. Half of a pitched roof.    **Gable**  To create the Gable (the triangular shape that fills the end of the pitched roof), create a triangular object and then resize, rotate, and move it into place. You can create brushes with odd numbers of faces by drawing the brush first then opening the main menu Brush and choosing the number of faces for the brush.  Try it out:   1. In the Top view click and drag to create a brush that is roughly half the size of the front wall of the building. 2. In the Brush main menu choose the 3 Sided option. The brush will turn into a triangular brush. 3. Use the Flip icons at the top left of the main toolbar to rotate the object. Look at the view name to see which axis to use, remember that x is usually horizontal and the other axis is vertical in the view. 4. When the gable is roughly in place, click and drag the lower corners to put them in the corners of the roof. 5. Move the object and resize it by dragging its edges. 6. Open the Selection main menu, choose the Drag item then choose Vertices from the small panel that opens. 7. Click and drag the small green vertex on the top of the triangular brush, place it just inside the apex of the roof. You will need to do this once more as there are vertices at the front and back of the triangular brush. Your gable should look something like the one shown in figure 12.34.   https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/12_033.jpg Figure 12.34. Gable.    **Arches**  Arches are a nice feature to add to your map. Creating an arch (figure 12.35) is easy when you know how.  https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/12_015.jpg Figure 12.35. An arch.  Follow the steps below to create the two parts of an arch:   1. Draw a brush. 2. In the Curves main menu open Primitives and choose End Cap. Your brush should turn into a flat curved plane, as in figure 12.36.  https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/12_035.jpg Figure 12.36. End Cap. 3. Open the Curves main menu again, choose Cap and then Inverted End Cap, using this option forms the surrounding exterior of the curved panel as shown in figure 12.37.   https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/12_016.jpg Figure 12.37. Grouped Inverted End Cap, with End Cap. 4. Using the axis icons in the main toolbar rotate the brush the orientation that you need. 5. Move the brush into position and resize it if required. 6. Create brushes that surround the arch as shown in figure 12.35.   **Distorting Brushes to Create Rounded Geometry**  When you want to make curved looking geometry place several brushes together then distort their corners. Say you made the brushes shown in figure 12,38, you could distort their corners so they look like figure 12.39.  https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/12_009.jpg Figure 12.38. 5 Brushes.  https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/12_022.jpg Figure 12.39. Vertices moved on 5 Brushes.  Try it out:   1. In the top view, create five brushes, one in the corner and two on either side. 2. Hold the Shift key down, click one of the five boxes to select it. 3. Press v on your keyboard to display vertices on the brush. 4. Move the small green dots around to form a curved looking corner in a corner, remember that there are two vertices (one under the other) at each corner of the box.   **Clipping an Object**  When you want to put a chamfer on the corner of an object use the Clipping tool.  Clipping example:   1. Create and select a brush. 2. Open the Selection main menu or press x on your keyboard. 3. Click above one edge of the brush. The number 1 should appear at the click position. 4. Click half way up and to the right of the object, the number 2 should appear, see figure 12.40. 5. Press the Enter key to clip the object.   https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/12_037.jpg Figure 12.40. Clipping numbers.  **Creating Patches**  Patches are the only truly curved geometry in MOH. They are also flat one sided objects. Make them large and chunky, patches can contain large numbers of faces that slow your level to a crawl. When you want a sloping bank up to a wall use a patch, if you make the slope steep the player cannot climb up the slope. This is one way of sealing off the boundary of your level.  https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/note.gifJust click to select at vertex level, hold the Control key to select more than one vertex.  Try creating and manipulating a patch in one corner of your level:   1. Zoom in to one corner of your level in the Top view. 2. Click and drag to draw a brush. 3. Open the Curve main menu and choose Simple Patch Mesh. A small dialog pops up (shown in figure 12.41) asking for the density of the Patch, higher numbers contain more faces, choose a number for the Width and Height density values.   https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/12_030.jpg Figure 12.41. Simple Patch Mesh density. 4. Click OK, the brush is now a flat, one sided patch. 5. Press your v button to display the vertices on the patch as shown in figure 12.42.   https://web.archive.org/web/20070920215631im_/http:/map.planetmedalofhonor.gamespy.com/mohaa/siteimages/andys_tut/12_011.jpg Figure 12.42. Vertices on a Patch. 6. Click a vertex, it should turn blue, use the Camera, Front or Side views to move the vertex. 7. Hold Shift and Control to select a row or column of vertices.   **Summary**  Once you get the editor set up and running smoothly, MOH Editing becomes a real pleasure. The superb range of textures and models that you can use in a scene turns even a simple map into a polished looking, fun level. This chapter only scratched the surface of what you can achieve with MOHRadiant. |