

CS162 Final Project
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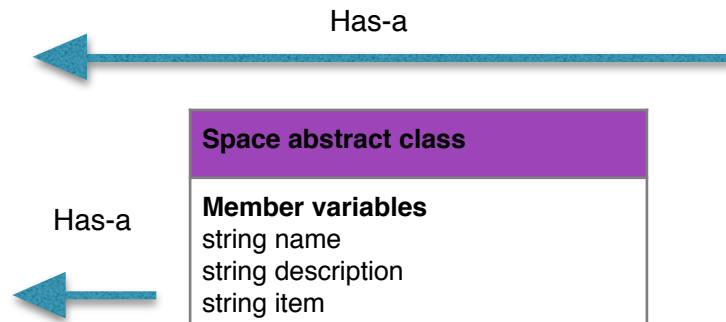
Program Requirements

This program is a choose your own adventure style text-based game. It leads the user through a series of connected spaces in a prison. The first time a space is entered, the user will be asked to change the space in some way and will be given a choice to take or leave an item. Subsequent visits will display a different short description with no interaction options. The prison, which has been taken over by the prisoners, is in the process of being taken back by law enforcement, who are shooting to kill. The user must try to make it from the starting place in the middle of the prison yard to a cell in a cell block where they will find relative safety. To gain access to the cell block, the prisoner must have the letter from a hostage and no more than one fellow inmate with him. If the prisoner has a knife, 2x4 or more than one fellow inmate, he is shot on sight even if he has the letter as well. The full version of the game may randomly kill the main character after each change in location as a way of limiting the time the user has to explore and finish the game.

For grading, the fastest way to finish the game is to choose to turn the timer off, leave the knife in the first space, move to the yard, leave the 2x4 in the second space, move to the northeast corner of the yard, take the letter, move back to the southwest corner of the yard, enter the tunnel, leave the pipe and enter the cell.

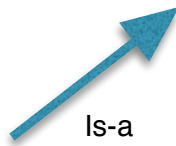
Because this is loosely based on a real event, I included an overhead map of the prison and a historical photo on which the character's situation is based. Most of the historical details came from the book *Blood in the Water: The Attica Prison Uprising* by Heather Ann Thompson, which is a good read about a troubling event.

Game class
Member variables Prisoner Gary Space *ts Space *cw Space *sw Space *se Space *ne Space *nw Space *tun Space *cell Space *location int roundCount bool inTunnel
Member functions intro movePrisoner enterLocation performAction itemDecision actionTaken itemTaken randomDeath getFate isStillAlive checkItem endGame setInTunnel getInTunnel getRoundCount setRoundCount



Space abstract class
Member variables string name string description string item string movementOptions Space *p1 Space *p2 Space *p3 Space *p4 Space *p5 int moveChoices int exposureLevel bool itemAvailable bool actionPerformed
Member functions getp1 getp2 getp3 getp4 getp5 setPointer setName setDescription setMovementOptions setMoveChoices setItem setExposureLevel setItemAvailable setActionPerformed getDescription getMovementOptions getMoveChoices getItem getName getExposureLevel getItemAvailable getActionPerformed virtual takeAction virtual takeItem

Prisoner class
Member variables string name list<string> items bool alive
Member functions setAlive setName getName addItem removeItem findItem getAlive



Is-a

class TimesSquare : public Space
Member variables string desc1 string desc2 string mOptions string actionPrompt string actionPrompt2 string itemPrompt string itemPrompt2
Member functions TimesSquare() takeItem takeAction changeDescription



Is-a

class Catwalk : public Space
Member variables string desc1 string desc2 string mOptions string actionPrompt string actionPrompt2 string itemPrompt string itemPrompt2
Member functions Catwalk() takeItem takeAction changeDescription



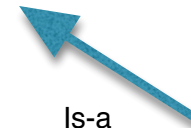
Is-a

class Yard : public Space
Member variables string desc1 string desc2 string mOptions string actionPrompt1 string actionPrompt2 string itemPrompt1 string itemPrompt2
Member functions Yard() takeItem takeAction changeDescription setDescription2 setIP1 setIP2 setAP1 setAP2



Is-a

class Tunnel : public Space
Member variables string desc1 string mOptions string actionPrompt1 string itemPrompt string itemPrompt2
Member functions Tunnel() takeItem takeAction



Is-a

class Cell : public Space
Member variables string desc1 string actionPrompt1 string itemPrompt1 string itemPrompt2
Member functions Cell() takeItem takeAction

Class Definitions

The Game class has several private member variables. It has a Prisoner object, eight pointers to Space objects to create the eight areas in which the game takes place and one pointer to a Space object, location, that stores the location of the Prisoner object in the game. It has an int, roundCount to track how many times the character has moved and a bool, inTunnel, which indicates whether or not the Prisoner has entered the final section of the game. It has a constructor that names the Prisoner and indicates that he is alive for the time being. It creates the eight game spaces and links their pointer variables to the appropriate space. Location is set to TimesSquare, the first space. It sets the member variables for the four separate Yard objects and names all of eight of the space objects. The intro() function displays background on the main character's situation. movePrisoner() gets and validates the user's choice and uses the location pointer to update the main character's position. randomDeath() gets a random integer for the chance of death and one for choose the random death prompt of which there are three. It checks to see if the chance integer falls between 0 and the threshold for exposure for the current location and displays a deathPrompt and kills the main character if it does. enterLocation() gets the name and description for the location just entered and displays them, then updates the round count. performAction() checks to see if the current location is the first and if not prompts the user press enter, then calls the virtual takeAction() function for the current location. itemDecision() calls the virtual takeItem() function for the current location, verifies that the location is not the cell, which has a special item case, and if the user chooses to add the item to the Prisoners collection, calls his addItem() function. It sets the location's itemAvailable to false whether the user takes the item or not, giving them one chance to take it even if they come back to the space. If the location is the cell, a special decision is presented. itemTaken() and actionTaken() get and return the current location's item availability and action status. getFate() is called when the main character attempts to enter the tunnel to the cell block. It searches his list of items and based on what he has, determines if he can progress to the end of the game. The wrong items lead to death. isStillAlive() get and returns the Prisoner's life status and endGame() displays the ending message.

The Prisoner class has private variables for the prisoner's name, a string, life status, a bool and a list of type string to store its items. It has get and set function for life status and name as well as item related functions addItem(), removeItem() and findItem(), which add, remove and search for a specific item. The findItem() function returns true if the Prisoner has the item.

The abstract class Space has several protected variables. It has strings for the space name, description, item and movement options as well as five pointers to Space to link the derived objects to each other. It has two ints, movChoices to store each derived object's number of movement options and exposureLevel to hold the chance of random death for the space. It has two bool variables to indicate the availability of the space's item and whether or not the space's action has been performed. It has set and get functions for all member variables as well as two pure virtual functions, takeAction() and takeItem(), which allow each derived class to specify the nature and mechanics of their actions and items.

The classes derived from the Space class include TimesSquare, Catwalk, Yard, Tunnel and Cell. Each has a combination of string variables for one or two descriptions, desc1 and possibly desc2, a string that lists movement options, mOptions, one or more action prompts, actionPrompt, actionPrompt1, actionPrompt2 and one or more item prompts, itemPrompt, itemPrompt1, itemPrompt2. Each has a constructor to set its inherited variables with its specific prompts and descriptions as well as uniquely defined takeAction() and takeItem() functions. If the class has more than one description it has a changeDescription() to update what the user is told when revisiting the space. The Yard class is instantiated four times in this game and is passed unique descriptions, prompts and options for each object and has additional set functions to individualize each Yard object.

The main() function seeds srand, creates a Game object, gets and validates the timer choice and starts the game. It loops through Game's enterLocation, and movePrisoner functions until the Prisoner is killed or tries to enter the tunnel to safety. As the Prisoner attempts to enter the tunnel, Game's getFate() function is called and the Prisoner is killed or admitted based on which items he has or doesn't have. If the Prisoner gains entry, they enter the tunnel, make one more item decision and progress to the end of the game.

Test Plan and Results

Test Case	Input Value	Driver Functions	Expected Outcome	Observed Outcome
Prisoner::addItem(), removeItem(), findItem()	add: "knife", "inmate", "pipe", "gas mask", "letter", "sandwich" find: "knife", "inmate", "pipe", "gas mask", "letter", "sandwich" remove: "sandwich". "knife", "inmate", "pipe", "gas mask", "letter", "sandwich"	main, Prisoner object, try/catch block	1st five are added, 6th is rejected, all objects stored return true for found, others false, all are removed, attempted removal of empty list sends message	<pre>added knife added inmate added pipe added gas mask added letter You cannot carry anything else. 1 1 1 1 1 1 0 removed knife removed inmate removed pipe removed gas mask removed letter You aren't carrying anything.</pre>

Test Case	Input Value	Driver Functions	Expected Outcome	Observed Outcome
Game():randomDeath	Times Square object set to exposure level of 100, function called 10 times	main, function call	random number between 0 and 100, random death (1-3) printed	<pre> 95 Something catches your eye on the time tiny pieces of brick spray y periphery of your aunt June's yar 90 A stray bullet nicks your right c inmates run past as you vision be 85 You stop walking and try to get y burning against your back. It's a the force of the slug. Lucky for 42 Something catches your eye on the time tiny pieces of brick spray y periphery of your aunt June's yar 78 You stop walking and try to get y burning against your back. It's a the force of the slug. Lucky for 41 Something catches your eye on the time tiny pieces of brick spray y periphery of your aunt June's yar 66 A stray bullet nicks your right c inmates run past as you vision be 54 Something catches your eye on the time tiny pieces of brick spray y periphery of your aunt June's yar 59 You stop walking and try to get y burning against your back. It's a the force of the slug. Lucky for 77 A stray bullet nicks your right c inmates run past as you vision be Program ended with exit code: 0 </pre>

Test Case	Input Value	Driver Functions	Expected Outcome	Observed Outcome
Game():randomDeath	Times Square object set to exposure level of 50, function called 10 times	main, function call	random number between 0 and 100, random death (1-3) printed if number is 0-50	<pre> 99 15 A stray bullet nicks your right inmates run past as you vision b 38 You stop walking and try to get burning against your back. It's the force of the slug. Lucky for 23 Something catches your eye on th time tiny pieces of brick spray periphery of your aunt June's ya 4 A stray bullet nicks your right inmates run past as you vision b 30 A stray bullet nicks your right inmates run past as you vision b 53 55 2 You stop walking and try to get burning against your back. It's the force of the slug. Lucky for 83 Program ended with exit code: 0 </pre>

Test Case	Input Value	Driver Functions	Expected Outcome	Observed Outcome
Game()::randomDeath	Times Square object set to exposure level of 25, function called 10 times	main, function call	random number between 0 and 100, random death (1-3) printed if number is 0-25	<pre>71 60 58 66 40 76 95 26 10 You stop walking and try to get y burning against your back. It's a the force of the slug. Lucky for 6 A stray bullet nicks your right c inmates run past as you vision be Program ended with exit code: 0</pre>

Test Case	Input Value	Driver Functions	Expected Outcome	Observed Outcome
Game()::movePrisoner, enterLocation()	timesquare to catwalk, catwalk to timesquare timesquare to yard	main, function calls	movement matches prompt, title and description displayed upon entering	<pre> Times Square The gunfire is deafening. It seems that you climbed not that long ago, side wrapped in tape, pressed up against the wall. J.R. begins to stain his collar. Must decide where to go. (1) Across the catwalk (2) Down the stairs to the yard 1 Catwalk It's not any safer here. J.R. from the catwalk, looking down at you, of sleeping in the dirt and you t Decide where to go. (1) Drop 15 feet to the yard (2) Back across the catwalk 2 Times Square The gunfire is deafening. It seems that you climbed not that long ago, side wrapped in tape, pressed up against the wall. J.R. begins to stain his collar. Must decide where to go. (1) Across the catwalk (2) Down the stairs to the yard 2 Yard: Southwest Corner </pre>

Test Case	Input Value	Driver Functions	Expected Outcome	Observed Outcome
Game()::movePrisoner, enterLocation()	catwalk to yard, yard se to ne, ne to se, se to nw, nw to se	main, function calls	movement matches prompt, title and description displayed upon entering	<pre> Catwalk It's not any safer here. J.R. days of sleeping in the dirt a Decide where to go. (1) Drop 15 feet to the yard (2) Back across the catwalk 1 Yard: Southeast Corner The gas is still thick down he ground near the tunnel. You se has a gas mask. Decide where to go. (1) Northeast corner (2) Northwest corner (3) Southwest corner 1 Yard: Northeast Corner The wall of B block appears so wounds that you should be unmo hostage, a CO by the name of F experiences that can befall a Decide where to go. (1) Southeast corner (2) Southwest corner (3) Northwest corner 1 Yard: Southeast Corner </pre>

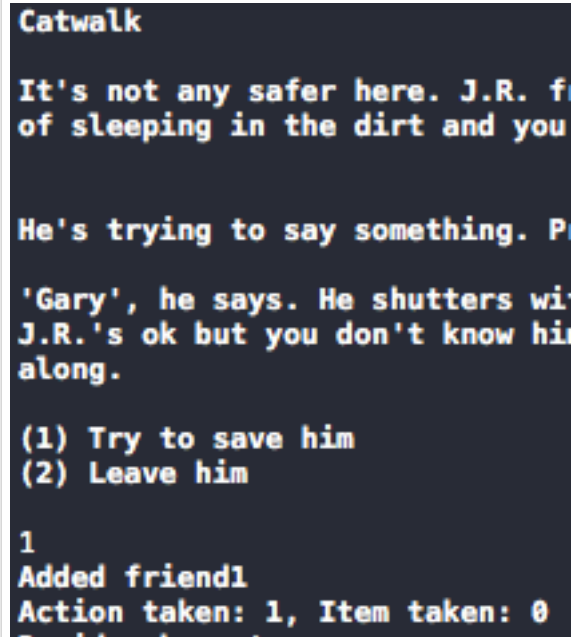
Test Case	Input Value	Driver Functions	Expected Outcome	Observed Outcome
Game()::movePrisoner, enterLocation()	sw to ne, ne to sw, sw to nw, nw to sw	main, function calls	movement matches prompt, title and description displayed upon entering	<pre> Yard: Southeast Corner The gas is still thick on the ground near the tunnel. You have a gas mask. Decide where to go. (1) Northeast corner (2) Northwest corner (3) Southwest corner 2 Yard: Northwest Corner You pause to catch your breath and back has you really needs intervention. Luck Decide where to go. (1) Northeast corner (2) Southeast corner (3) Southwest corner 2 Yard: Southeast Corner The gas is still thick on the ground near the tunnel. You have a gas mask. Decide where to go. (1) Northeast corner (2) Northwest corner (3) Southwest corner 3 Yard: Southwest Corner You look around. The steady percussion of rifle fire Decide where to go. (1) Northwest corner (2) Northeast corner (3) Southeast corner (4) Enter the tunnel (5) Climb back up to the 3 Yard: Southeast Corner </pre>

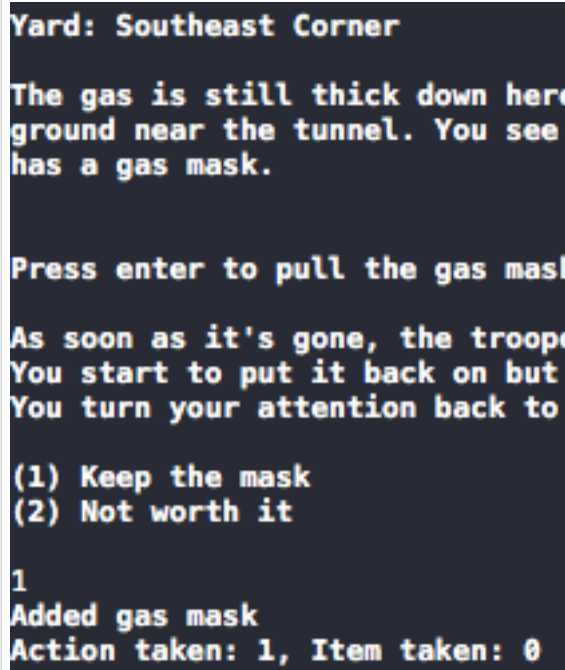
Test Case	Input Value	Driver Functions	Expected Outcome	Observed Outcome
Game()::movePrisoner, enterLocation()	se to nw, nw to se, se to sw, sw to se	main, function calls	movement matches prompt, title and description displayed upon entering	<pre> Yard: Southwest Corner You look around. The steady percussion of rifle fire is heard from the north. Decide where to go. (1) Northwest corner (2) Northeast corner (3) Southeast corner (4) Enter the tunnel (5) Climb back up to the roof 2 Yard: Northeast Corner The wall of B block appears to be made of concrete. The wall is so high that you should be able to see the hostages, a CO by the name of Smith, and the experiences that can be seen from the top. Decide where to go. (1) Southeast corner (2) Southwest corner (3) Northwest corner 2 Yard: Southwest Corner You look around. The steady percussion of rifle fire is heard from the north. Decide where to go. (1) Northwest corner (2) Northeast corner (3) Southeast corner (4) Enter the tunnel (5) Climb back up to the roof 1 Yard: Northwest Corner You pause to catch your breath and back has you need intervention. Luckily, you are not alone. Decide where to go. (1) Northeast corner (2) Southeast corner (3) Southwest corner 3 Yard: Southwest Corner </pre>

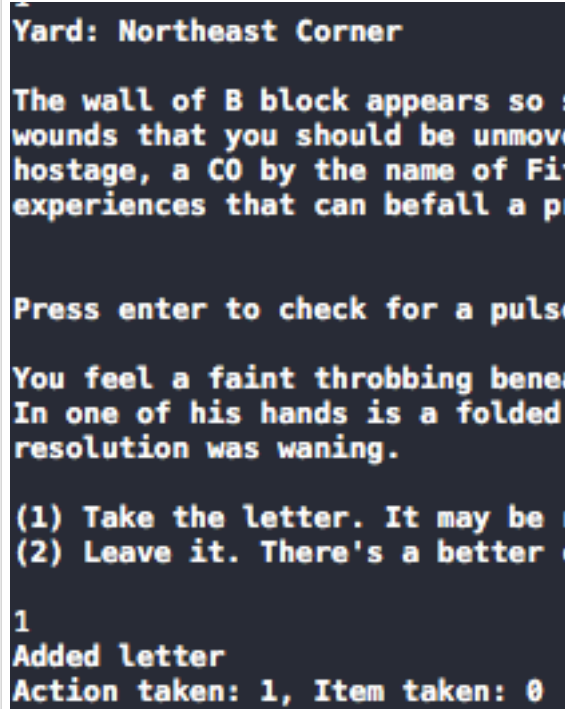
Test Case	Input Value	Driver Functions	Expected Outcome	Observed Outcome
Game()::movePrisoner, enterLocation()	nw to ne, ne to nw, sw to times square	main, function calls	movement matches prompt, title and description displayed upon entering	<pre> Yard: Northwest Corner You pause to catch your head and back has you r needs intervention. Luc Decide where to go. (1) Northeast corner (2) Southeast corner (3) Southwest corner 1 Yard: Northeast Corner The wall of B block app wounds that you should hostage, a C0 by the na experiences that can be Decide where to go. (1) Southeast corner (2) Southwest corner (3) Northwest corner 3 Yard: Northwest Corner You pause to catch your head and back has you r needs intervention. Luc Decide where to go. (1) Northeast corner (2) Southeast corner (3) Southwest corner 3 Yard: Southwest Corner You look around. The st steady percussion of ri Decide where to go. (1) Northwest corner (2) Northeast corner (3) Southeast corner (4) Enter the tunnel (5) Climb back up to th 5 Times Square </pre>

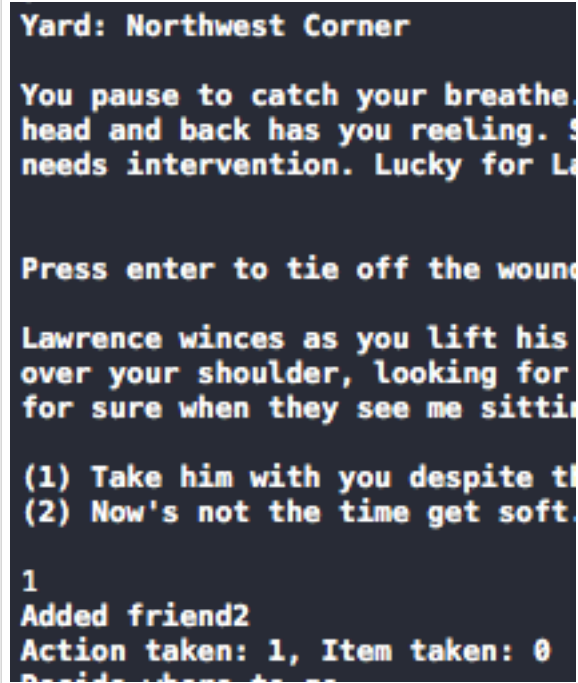
Test Case	Input Value	Driver Functions	Expected Outcome	Observed Outcome
Game()::movePrisoner, enterLocation()	sw to tunnel	main, function calls	movement matches prompt, title and description displayed upon entering	<pre> Yard: Southwest Corner You look around. The stairs leading b steady percussion of rifle rounds and Decide where to go. (1) Northwest corner (2) Northeast corner (3) Southeast corner (4) Enter the tunnel (5) Climb back up to the roof of Time 4 All around you is mass murder. You ha with shotguns standing guard over the notice you. Decide where to go. Press enter to enter the cell block. </pre>

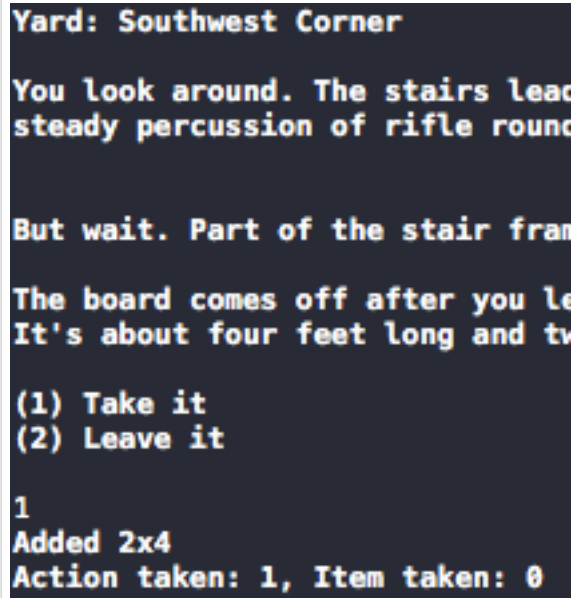
Test Case	Input Value	Driver Functions	Expected Outcome	Observed Outcome
Game::performAction(), itemDecision(), actionTaken(), itemTaken() Times Square		1 main, function calls	action taken 1 item taken 0 (not available)	 <pre> Times Square The gunfire is deafening. It seems that you climbed not that long a side wrapped in tape, pressed up begins to stain his collar. Must Press enter to let him go. You let him go and moments later think. Time to split. You hold the knife in your hands with your hands. (1) Take it (2) Drop it 1 Added knife Action taken: 1, Item taken: 0 </pre>

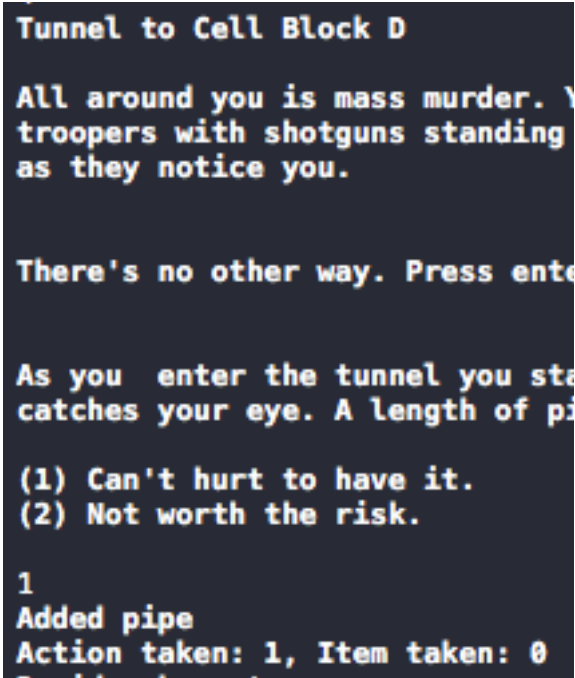
Test Case	Input Value	Driver Functions	Expected Outcome	Observed Outcome
Game::performAction(), itemDecision(), actionTaken(), itemTaken() Catwalk		1 main, function calls	action taken 1 item taken 0 (not available)	 <pre> Catwalk It's not any safer here. J.R. f of sleeping in the dirt and you He's trying to say something. P 'Gary', he says. He shutters wi J.R.'s ok but you don't know hi along. (1) Try to save him (2) Leave him 1 Added friend1 Action taken: 1, Item taken: 0 </pre>

Test Case	Input Value	Driver Functions	Expected Outcome	Observed Outcome
Game::performAction(), itemDecision(), actionTaken(), itemTaken() Yard se		1 main, function calls	action taken 1 item taken 0 (not available)	 <pre> Yard: Southeast Corner The gas is still thick down here on the ground near the tunnel. You see a gas mask. Press enter to pull the gas mask off. As soon as it's gone, the troops start to put it back on but you turn your attention back to the gas mask. (1) Keep the mask (2) Not worth it 1 Added gas mask Action taken: 1, Item taken: 0 </pre>

Test Case	Input Value	Driver Functions	Expected Outcome	Observed Outcome
Game::performAction(), itemDecision(), actionTaken(), itemTaken() Yard ne		1 main, function calls	action taken 1 item taken 0 (not available)	 <pre> Yard: Northeast Corner The wall of B block appears so wounds that you should be unmov hostage, a C0 by the name of Fi experiences that can befall a p Press enter to check for a pulse You feel a faint throbbing bene In one of his hands is a folded resolution was waning. (1) Take the letter. It may be (2) Leave it. There's a better 1 Added letter Action taken: 1, Item taken: 0 </pre>

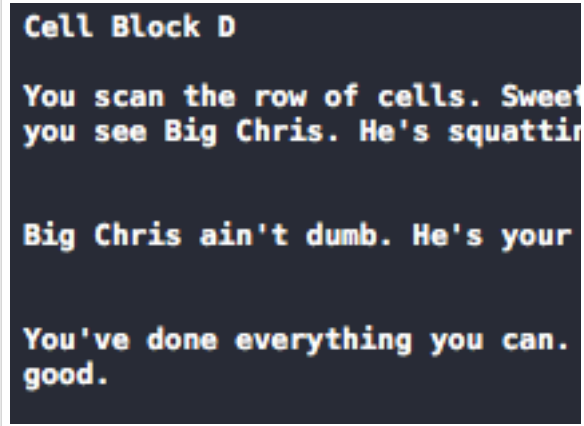
Test Case	Input Value	Driver Functions	Expected Outcome	Observed Outcome
Game::performAction(), itemDecision(), actionTaken(), itemTaken() Yard nw		1 main, function calls	action taken 1 item taken 0 (not available)	 <pre> Yard: Northwest Corner You pause to catch your breathe, head and back has you reeling. S needs intervention. Lucky for L Press enter to tie off the wound Lawrence winces as you lift his over your shoulder, looking for for sure when they see me sittin (1) Take him with you despite th (2) Now's not the time get soft. 1 Added friend2 Action taken: 1, Item taken: 0 </pre>

Test Case	Input Value	Driver Functions	Expected Outcome	Observed Outcome
Game::performAction(), itemDecision(), actionTaken(), itemTaken() Yard sw		1 main, function calls	action taken 1 item taken 0 (not available)	 <pre> Yard: Southwest Corner You look around. The stairs lead steady percussion of rifle round But wait. Part of the stair frame The board comes off after you lean It's about four feet long and two (1) Take it (2) Leave it 1 Added 2x4 Action taken: 1, Item taken: 0 </pre>

Test Case	Input Value	Driver Functions	Expected Outcome	Observed Outcome
Game::performAction(), itemDecision(), actionTaken(), itemTaken() tunnel	1	main, function calls	action taken 1 item taken 0 (not available)	
Game::getFate() knife death	add only knife, try to enter tunnel	Full game	Knife death message	Knife death message displayed
Game::getFate() 2x4 death	add only 2x4, try to enter tunnel	Full game	2x4 death message	2x4 death message displayed

Test Case	Input Value	Driver Functions	Expected Outcome	Observed Outcome
Game::getFate() too many friends death	add both friends, try to enter tunnel	Full game	Too many friends death message	Too many friends death message displayed
Game::getFate() 1 friend, no letter death	add J.R., try to enter tunnel	Full game	no letter death message	No letter death message displayed
Game::getFate() 1 friend, no letter death	add Lawrence, try to enter tunnel	Full game	no letter death message	No letter death message displayed
Game::getFate() letter, no death	add only letter	Full game	passage to tunnel granted, game continues	Passage granted game continues

Test Case	Input Value	Driver Functions	Expected Outcome	Observed Outcome
Game::enterLocation() cell with pipe	pick up pipe in tunnel don't give to Chris	full game	pipe prompts choice in cell, give to Chris message	<pre> 1 Added pipe Decide where to go. (1) Enter the cell block. 1 Cell Block D You scan the row of cells. Sw you see Big Chris. He's squat 'Nothing to protect myself', (1) Give him the pipe. (2) Survival of the fittest. 2 'Naw', you say as you crouch </pre>
Game::enterLocation() cell with pipe	pick up pipe in tunnel give to Chris	full game	pipe prompts choice in cell	<pre> (1) Give him the pipe. (2) Survival of the fittest. 1 You hand the pipe to Big Chris. He nods. 'Might catch you a bullet', you say. 'I'll take my chances.' </pre>

Test Case	Input Value	Driver Functions	Expected Outcome	Observed Outcome
Game::enterLocation() cell without pipe	leave pipe in tunnel	full game	no pipe choice in cell	 <p>Cell Block D</p> <p>You scan the row of cells. Sweet you see Big Chris. He's squattin</p> <p>Big Chris ain't dumb. He's your</p> <p>You've done everything you can. good.</p>

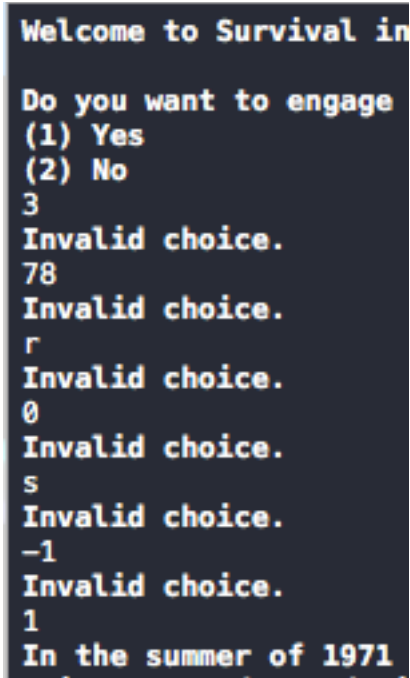
Test Case	Input Value	Driver Functions	Expected Outcome	Observed Outcome
<p>Game::enterLocation()</p> <p>2nd location description printed after first visit</p>	times square to catwalk to times square to catwalk	full game	Times square desc1 action prompt and item prompt, catwalk desc1, action prompt, item prompt, times square desc2, catwalk desc2	<pre> Times Square The gunfire is deafening. It se and that you climbed not that l one side wrapped in tape, press begins to stain his collar. Mus Press enter to let him go. You let him go and moments late think. Time to split. You hold the knife in your hand with your hands. (1) Take it (2) Drop it 1 Added knife Decide where to go. (1) Across the catwalk (2) Down the stairs to the yard 1 Catwalk It's not any safer here. J.R. f days of sleeping in the dirt an He's trying to say something. F 'Gary', he says. He shutters wi J.R.'s ok but you don't know hi along. (1) Try to save him (2) Leave him 1 Added friend1 Decide where to go. (1) Drop 15 feet to the yard (2) Back across the catwalk 2 Times Square Back here again! There's no cov Decide where to go. (1) Across the catwalk (2) Down the stairs to the yard 1 Catwalk Nothing here for you but your e Decide where to go. (1) Drop 15 feet to the yard (2) Back across the catwalk </pre>

Test Case	Input Value	Driver Functions	Expected Outcome	Observed Outcome
<p>Game::enterLocation()</p> <p>2nd location description printed after first visit</p>	<p>catwalk to yard se to yard ne to yard se to yard ne</p>	<p>full game</p>	<p>Yard se desc1 action prompt and item prompt, Yard ne desc1, action prompt, item prompt, Yard se desc2, Yard ne desc2</p>	<pre> Yard: Southeast Corner The gas is still thick down ground near the tunnel. You has a gas mask. Press enter to pull the gas As soon as it's gone, the tr You start to put it back on You turn your attention back (1) Keep the mask (2) Not worth it 1 Added gas mask Decide where to go. (1) Northeast corner (2) Northwest corner (3) Southwest corner 1 Yard: Northeast Corner The wall of B block appears wounds that you should be un hostage, a CO by the name of experiences that can befall Press enter to check for a p You feel a faint throbbing b In one of his hands is a fol resolution was waning. (1) Take the letter. It may (2) Leave it. There's a bett 1 Added letter Decide where to go. (1) Southeast corner (2) Southwest corner (3) Northwest corner 1 Yard: Southeast Corner The trooper is still laying Decide where to go. (1) Northeast corner (2) Northwest corner (3) Southwest corner 1 Yard: Northeast Corner Fitzpatrick is dead. There's Decide where to go. </pre>

Test Case	Input Value	Driver Functions	Expected Outcome	Observed Outcome
<p>Game::enterLocation()</p> <p>2nd location description printed after first visit</p>	<p>yard ne to yard nw to yard sw to yard nw to yard sw</p>	<p>full game</p>	<p>Yard nw desc1 action prompt and item prompt, Yard sw desc1, action prompt, item prompt, Yard nw desc2, Yard sw desc2</p>	<pre> Yard: Northwest Corner You pause to catch your breath and back has you reel. You need intervention. Lucky for you. Press enter to tie off the rope. Lawrence winces as you lift the board over your shoulder, looking for sure when they see me. (1) Take him with you despite the pain. (2) Now's not the time get back to work. 1 Added friend2 Decide where to go. (1) Northeast corner (2) Southeast corner (3) Southwest corner 3 Yard: Southwest Corner You look around. The staircase is a steady percussion of rifle fire. But wait. Part of the staircase is missing. The board comes off after you pull it. It's about four feet long and four feet wide. (1) Take it (2) Leave it 1 Added 2x4 Decide where to go. (1) Northwest corner (2) Northeast corner (3) Southeast corner (4) Enter the tunnel (5) Climb back up to the roof. 1 Yard: Northwest Corner Nothing here but the brown dirt. You make it. Decide where to go. (1) Northeast corner (2) Southeast corner (3) Southwest corner 3 Yard: Southwest Corner Nothing's changed. Every second counts. Decide where to go. </pre>

Test Case	Input Value	Driver Functions	Expected Outcome	Observed Outcome
Game::movePrisoner() input validation	times square 5, 78, r, 0, s, -1, 1	Full game	error message each time until 1 is input	<pre> Decide where to go. (1) Across the catwalk (2) Down the stairs to the yard 5 No time for mistakes! Where you going? 78 No time for mistakes! Where you going? r No time for mistakes! Where you going? 0 No time for mistakes! Where you going? s No time for mistakes! Where you going? -1 No time for mistakes! Where you going? 1 Catwalk </pre>

Test Case	Input Value	Driver Functions	Expected Outcome	Observed Outcome
TimesSquare::takeItem() input validation	times square 3, 78, r, 0, s, -1, 1	Full game	error message each time until 1 is input	<pre> You hold the knife in your hands. If with your hands. (1) Take it (2) Drop it 3 Take it or leave it. Make a choice! 78 Take it or leave it. Make a choice! r Take it or leave it. Make a choice! 0 Take it or leave it. Make a choice! s Take it or leave it. Make a choice! -1 Take it or leave it. Make a choice! 1 Added knife Decide where to go. </pre>

Test Case	Input Value	Driver Functions	Expected Outcome	Observed Outcome
main() death choice input validation	3, 78, r, 0, s, -1, 1	Full game	error message each time until 1 is input	 <pre> Welcome to Survival in Do you want to engage (1) Yes (2) No 3 Invalid choice. 78 Invalid choice. r Invalid choice. 0 Invalid choice. s Invalid choice. -1 Invalid choice. 1 In the summer of 1971 </pre>

Test Case	Input Value	Driver Functions	Expected Outcome	Observed Outcome
main() random death timer on	1 at menu	full program, high exposure level set to 100	random death occurs after first move	<pre> You hold the knife in your hands. If you d with your hands. (1) Take it (2) Drop it 1 Added knife Decide where to go. (1) Across the catwalk (2) Down the stairs to the yard 1 37 Something catches your eye on the roof of This time tiny pieces of brick spray your on the periphery of your aunt June's yard Thanks for playing! </pre>

Test Case	Input Value	Driver Functions	Expected Outcome	Observed Outcome
main() random death timer off	2 at menu	full program, high exposure level set to 100	no random death after several moves	<pre> Added knife Decide where to go. (1) Across the catwalk (2) Down the stairs to the yard 1 Catwalk It's not any safer here. J.R. from 3 days of sleeping in the dirt and you He's trying to say something. Press e 'Gary', he says. He shutters with eve J.R.'s ok but you don't know him that along. (1) Try to save him (2) Leave him 1 Added friend1 Decide where to go. (1) Drop 15 feet to the yard (2) Back across the catwalk 1 Yard: Southeast Corner The gas is still thick down here. It ground near the tunnel. You see his c has a gas mask. Press enter to pull the gas mask off As soon as it's gone, the trooper sta You start to put it back on but then You turn your attention back to the g (1) Keep the mask (2) Not worth it 1 Added gas mask Decide where to go. (1) Northeast corner (2) Northwest corner (3) Southwest corner 2 Yard: Northwest Corner </pre>

Reflections

A lot of the problem solving that took place in this project centered around inheritance. I used base-class pointers to create the derived spaces as expected and used them to call base-class public functions without a problem. I used four different objects of the same derived class, Yard, to break the prison yard into quadrants, each with its own name, description, item etc. Because of this the Yard class had its own set functions and it took me a while, looking through the text and stackoverflow, to be reminded of the need to `static_cast` base pointers. I also struggled with whether to use set functions or the combination of derived and base constructor parameters to initialize member variables. I decided to have the unique derived objects set their own variables, inherited and otherwise, in their constructors, bypassing the base constructor. The Yard objects were initialized by the Game constructor. I searched for reasons why this approach shouldn't be used, but didn't find any. For me it made sense because of the combination of single use and multiple use of the derived objects.

Inheritance popped up again when it came time to free the memory allocated to the Space-derived objects. This proved to be challenging because the text touched on virtual destructors, but not on their role in freeing memory. Search stackoverflow eventually led to a solution and design paradigm: abstract classes must have virtual destructors and are responsible for cleaning up things that are under their control. I used the Space destructor to unlink the Space-derived objects because the derived constructors I tried to implement could not do it. The Game class constructor also couldn't unlink them without causing memory leaks, even with the `setPointer` function. Ultimately the combination of the Space destructor unlinking its pointers and the Game destructor freeing allocated memory led to a lack of leaks. This left nothing for the derived destructors to free or dismantle, so I left the implicit destructor in place. I ran across the best practices book on github while trying to see if this was ok and read about the Rule of Zero, which makes sense and seems to validate this choice.

The final problem I came across was the ambiguity in the assignment about using all four pointers in each space. In the description it seems like each object has to have that amount of pointers and that they we should 'try' to use them all. Then in the rubric it seems like we have to use all of them. The design of my game, which is based on an actual Prison uprising in an actual Prison, limited the movement options in some of the spaces. I gave the Space class five pointers because I have one derived space that uses all five. The rest of the spaces use three, two or one of the pointers because of the layout and design of the game. I hope that my ability to manipulate pointers is apparent even if the number of pointers each space needs fluctuates.

Overall this was a challenging and engaging assignment which forced me to clarify and solidify my understanding of several programming areas. The open ended nature has made me want to become clear on best practices given that goals can be accomplished in many ways, all of which have space and performance advantages and repercussions.