

AP Computer Science



Mr Hanley



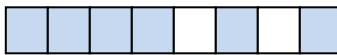
Assignment 10/1010₂/12₈/A₁₆ Version: 5.0

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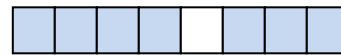
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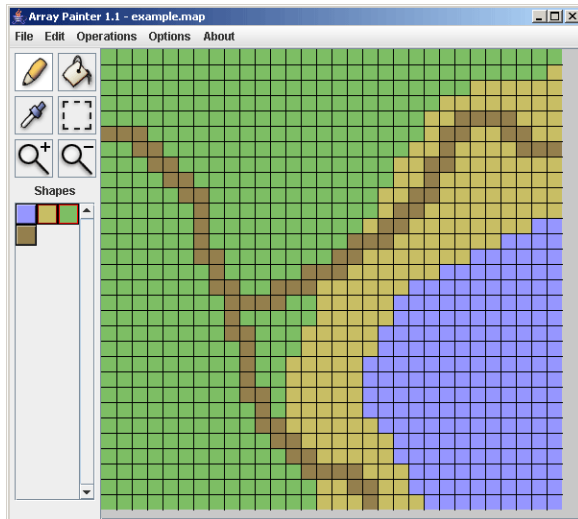
Ones Comp



Twos Comp



2D Array Practice



Create a Project that uses a 2D array

Use a 2D array in a project in java.

Project can be console or GUI.

You need to use the Model-View-Controller Design pattern if you are using a GUI
This involves dedicating a java file to representing the information used in your program in a file called a model.

Make sure to create an instance of your model in your frame and use the methods of the model to control what is happening.

* Dynamic Memory * Big O Notation * Stacks * Extreme Programming * Selection Sort * Insertion Sort * Waterfall Model

String * Arrays * ArrayList * Client Server * Artificial Intelligence * Inheritance * Files * Video Games * Short circuit evaluation *

Ideas;

1. Make a tile matching game.

Use a 2d array of integers, chars or strings. Scramble em up so the game is different each time.

It can be one player or 2 player.

If using a GUI, make sure there is a model that is in a separate file that the Frame makes an instance of.

You can use colors or numbers or letters or images to present to the user.

Minimum size: 4 X 4, as big as you want

Model must be able to shuffle

Model must be able to play additional games.

MUST HAVE a scoring system. If two player, count the matches...if one player, try -5 for each miss and +20 for each match!!!!!!

Project 1 Name	Assign 10 Matching Game
Class 1 Name	MatchingModel
Class 2 Name	MatchingFrame

Rubric – Matching Game	
Randomly Scatters Pieces	20
Interface with user	20
Resets Game	10
Does Good Stuff – Game Logic	30
Scoring System	20
Comments	10
TOTAL	110

2. Make a movie theater management system.

Create a program that allows a theater owner to schedule movies in their cinema.

Allow for at least 6 theaters and 5 different times.

Must keep tracking of movie name and rating

Options must include;

- a. **Schedule a specific theater and time**
- b. **Schedule a theater for one movie all day**
- c. **Schedule a movie for every single time**
- d. **Clear out a theater**
- e. **Search for all movie times for a specific movie**

f. Search for all movies of a specific rating

In order to accomplish this task, I would like you to define at least two different classes. The **Movie** class will represent an individual film. It must have at least 4 different variables; a title, mpaa rating, running time(int for minutes) and a quality rating (I use rotten tomatoes)

The **Theater or Cinema** class has a 2D array of Movie objects. It contains a variety of methods for manipulating the 2D array. A display method loops through the movies, for any null movie, simply print the word <Empty>. For any non-null movie, print the title and mpaaRating. You can also print the rotten tomatoes or star rating if you wish.

I have found the command `System.out.format("%-20s", movieDisplay);` extremely helpful during this project. This means print to the console using a 20 character width and left justify the output. Left justified means push the String to the left of the 20 character field.

I also really like to have an option called autofill when I first start the program or from the menu. This uses an array of Movie objects. It randomly fills in the 2D array with pre built movies from the array. Remember to use a deep copy, not a shallow copy.

What the heck am I talking about? Use `cinema[r][c] = new Movie(preload[x]);` That way you get your own memory when copying a movie, instead of just pointing to the same movie that is in the one d array.

Searching the 2d array for a target movie, should allow the user to type in a movie name and try to find the name in the 2D array. **Don't do any comparisons with null references, as this will cause an error.**

Print out a list of movies that fit the criteria and the time they are playing.

Searching by rating (mpaa or rotten tomatoes, you decide) should also print out a list of movies that fit the criteria and the time they are playing.

See the example on YouTube

Project 1 Name	Assign 10 Movie Cinema
Class 1 Name	Movie
Class 2 Name	Cinema

Rubric – Movie Theater Manager

Schedule a specific theater and time	10
Schedule a theater for one movie all day	10
Schedule a movie for every single time(same movie all time slots in a theater)	20
Display movies as a grid (summary info)	15
Ease of use	10
Clear out a theater	5
Search for all movie times for a specific movie	10
Search for all movies of a specific rating	10
Edit Details of Specific Movie	10
Comments	10
TOTAL	110

3. Make a word search program

Allow the user to type in 10 words.

Arrange them in a word search. Must have two diagonal left to right, two diagonal right to left. At least one vertical and one horizontal

Every search must have at least 4 overlapping letters.

Good luck, this drove Pat Millington nuts!!!!

Project 1 Name

Assign 10 Word Search

Class 1 Name

WordSearchModel

Class 2 Name

Main

Rubric – Word Search

Allows user to type in up from 10-15 words	10
Makes a 2D Array of chars or Strings for the wordsearch	10
Places words randomly	20
Must have two diagonal left to right	10
two diagonal right to left	10
one horizontal	10
At least one vertical	10
at least 4 overlapping letters	20
Comments	10
TOTAL	110

4. Make the game Minesweeper

Make a **MinesweeperModel** and a **MineSweeperFrame**. The Model contains a 2d array which represents the board.

Is it a good idea to have a tile class that stores whether or not the cell is showing or hidden and whether or not it has been flagged???

Project 1 Name	Assign 10 MineSweeper
Class 1 Name	Tile?
Class 2 Name	MineSweeperModel
Class 3 Name	MineSweeperFrame
Class 4 Name	MineSweeperApp

Rubric – Minesweeper

Randomly places mines throughout a board(makes sure they are not on top of each other)	20
Reveals number of adjacent mines when clicking a square	15
Allows the user to flag a mine	15
Resets the board to a new level	15
Uncovers all adjacent 0 spaces	15
Has at least 3 levels	10
Has a timer to keep track of how many seconds elapsed	5
Works when two mines are right next to each other	5

Comments	10
TOTAL	110

5. Make a 2 player battleship game

Allow each player to place their ships.

Take shots at each others grid. Each hit garners an additional guess.

Must report when individual ships are sunk. It would be neat to be able to create a grid class that is reusable for each player. Must be able to restart game.

Your battleship game **MUST** have an auto place feature that places all ships for a player.

Rubric – 2 Player Battleship	
Allow each player to place ships without overlapping	20
Bounds check each guess input	10
Keeps track and reports individual ship sinking	15
Uses an object oriented grid so code is NOT duplicated for BOTH PLAYERS	15
AutoFill Feature	10
Ends game properly	15
Coolness of interface	5
Allows game to reset	10
Comments	10
TOTAL	110

6. Implement Columnar Encryption

See <http://practicalcryptography.com/ciphers/columnar-transposition-cipher/>

Must be able to encrypt and decrypt.

ONLY USE CAPITAL LETTERS

Allow the user to enter in a keyword (no repeated letters) and a plain text. Encrypt the text and print out the cipher text.

Develop two different classes. **ColumnarEncrypter** and **EncryptTester**.

ColumnarEncrypter is an object oriented encryption class.

Its purpose is to accept a keyword from the EncryptTester and a phrase from the EncryptTester. It will use these to build a 2D array of letters, padded with a capital A or X. Print this matrix to the screen so we can examine it when you are encrypting and decrypting. Then show the cipher text or plain text.

EncryptTester provides the user with a menu like below

1. Encrypt
2. Decrypt
3. Quit

The tester should make an instance of the **ColumnarEncrypter** and should prompt the user for inputs. Then pass the inputs to the **ColumnarEncrypter** to do its thing. I need to see the intermediate array of characters. Print it to the console.

Then print the rearranged matrix to the screen

Then print out the cipher text or plain text

Project 1 Name	Assign 10 Columnar Encryption
Class 1 Name	ColumnarEncrypter
Class 2 Name	EncryptTester

Rubric – Columnar Encryption	
Allow the person to enter in a unique key no spaces, and only unique letters	20
Pads with X's or A's (upper case)	10
Transform the plain text into a cipher text accurately	30
Takes existing key and cipher text and converts back to plain text	30
Ease of Use	10
Comments	10
TOTAL	110

7. Develop a Map Editor

Making a maze game can be time consuming.

How nice would it be for someone to have an editor that lets them load up and edit symbols in a 2d maze and then save them to a disk file.

Rubric – Map Editor	
Allows placing of at least 5 different symbols	20
Allows size variations from 10 X 10 -> 100 X 100	30
Correctly stores in file	30
Correctly loads from file	20
Comments	10
TOTAL	110

8. Make a 2 player Checkers Game

Don't go here....This will consume hours and hours....Dylan Nezaj and Andrew Schusterman (2019) went there and I think they actually work. Be sure to check up on the rules. If you can jump, you MUST!!! No need for an ai.

Rubric – Checkers	
Initial Setup	20
Allows movement (double jumps also)	30
Detects when jumps are possible and forces jump	30
Allows Kings to be anointed and move both ways	20
Comments	10
TOTAL	110

9. Make a 2 player Reversi Game

This is difficult. It consumed Devin Jensen in the semester class. Best if you do, use a timer to show the pieces animate. That would be really cool. Sammy no Wammy Price also dove in (fall 2018).

Sometimes at end of game you cannot make a move, make sure it knows and skips turn

Project Name	Assign 10 Reversi or Othello
Class 1 Name	ReversiModel
Class 2 Name	ReversiApp
Class 3 Name	ReversiFrame

Rubric – Reversi	
Flips pieces to appropriate color	20
Flips in multiple directions for one piece	20
Allows Scoring/Final Tally	20
Ends game properly	10
Coolness of interface	10
Allows game to reset	10
If no moves, allows player to skip turn	10
Comments	10
TOTAL	110

10. Make a Dungeons and Dragons Style Game

Allow a player to move around a maze and collect stuff. He or she must be able to fight against enemies and use at least two different weapons. The maze must be at least 40 X 40.

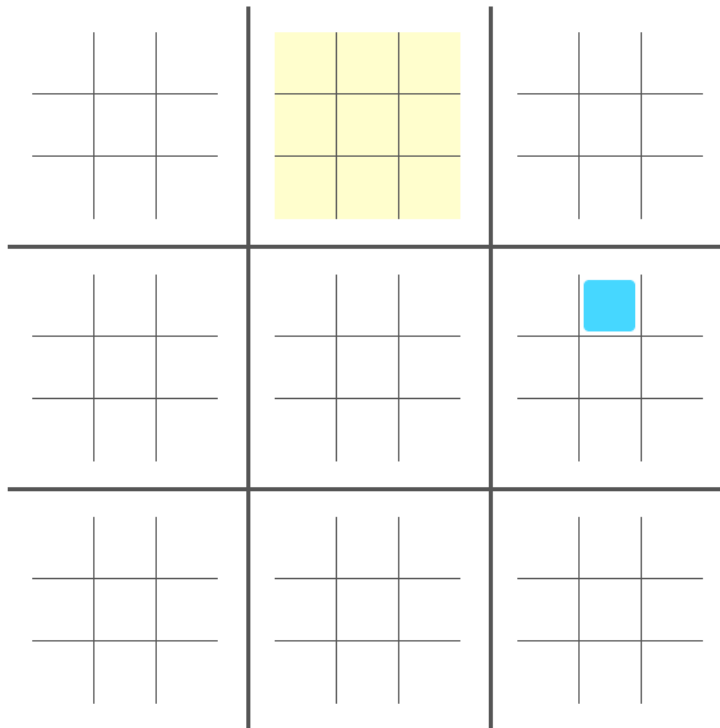
Project Name	Assign 10 RPG
Class 1 Name	MazeModel
Class 2 Name	MazeMain
Class 3 Name	Creature

Rubric – RPG	
Initial Setup	20
Prevents player from moving through walls	15
Collects items	15
Encounter logic (includes melee)	20
Fun Factor (how fun is your game?)	30
Comments	10
TOTAL	110

11.Ultimate Tic Tac Toe

The game of ultimate Tic Tac Toe is 9 separate games with one big game.

Ultimate Tic Tac Toe



Move-Nr: 1 Waiting for opponent...

Your opponent has not yet opened the game.
Send him/her the URL to this page.

You will see the rules online....you might want to use a special JPanel which will allow you to paint graphics on top of the JPanel.....

Rubric – Ultimate Tic Tac Toe

Initializes Board	20
Allows Player to Place an X or O in a square	15
Forces other player to put a X in appropriate board	20
Processes winning on smaller boards	10
Coolness of interface	10
Allows game to reset	10
Processes Ties on Big Board	10
Comments	10
TOTAL	110

Scale	
Matching Game	Normal
Movie Theater	+6
Word Search	+4
MineSweeper	+9
BattleShip	+8
Columnar Encryption	+6
Map Editor	+5
Checkers	+15
Reversi	+5
Maze Game	+10
Ultimate Tic Tac Toe	+7
GUI Bonus	+6