Concordia University
Department of Computer Science
and Software Engineering

Advanced Program Design with C++
COMP 345 --- Fall 2013

Project Build 2 Grading

1. Incremental Code Build Description

You must deliver an operational version demonstrating some capacity of your system. This is about demonstrating that the code build is effectively aimed at solving a specific project problem or completely implementing specific system features. The goal of the build must be presented first, then demonstration is made to show that the goal has been met, and also to explain some parts of your code. The code build must not be just a "portion of the final project", but rather be something useful with a purpose on its own. All code must be integrated into a single project.

2. Identification

Team	Evaluator	Signature	Date	Time

3. Grading

Presentation		**5**
~~Explanation of the architectural design of the entire project~~		~~1~~
~~Knowledge of code base/clarity of explanations~~		~~2~~
~~Effectiveness and demonstrated preparation of the presentation~~		2
Character generation/edition		**6**
Creating/editing a *fighter* character following the d20 game rules as described below: level, ability scores and ability modifiers, hit points and base attack modifier proportional to level.		3
Inventory pane, including worn items: armor, shield, gloves, bracers, rings, helmet, boots, belt, backpack. Equip /unequip items. Wearing a maximum one of each kind of item.		2
Save/load a character to/from a file, including all owned/worn items.		2
Map generation/edition		**5**
Create a map of a user-defined size		2
Place game elements on a map (entry point, exit point, doors, chests, monsters, …)		2
Save/load a map to/from a file		1
Play		**22**
Select a map and character from a list of saved ones		1
Start the game by having the player character placed on the starting point, the monsters' levels are adjusted to the level of the player character, and a chest containing items that the character can acquire and use, and that are adapted to his level is on the map.		3
Player character can equip/unequip items during play.		1
Magic items have effects on characteristics or armor class (see below). Armor class adjusted to worn armor and shield, ability scores adjusted to worn items magical modifiers.		4
~~The game follows the turn-based game sequence as described below, including moving and attack following the d20 rules.~~		5
End the map by having the character stepping on the exit point, the exit point being activated only when all monsters on the map have been defeated.		1
Player character automatically goes up a level and is saved upon exiting the map. The player is then given the option to play another map with the same character or exit the game.		3
~~Logging window clearly showing that the d20 rules are followed during game play, including dice rolls, and all applicable values and modifiers used in the calculations~~.		4
Design and programming style		**10**
Use of significant names for identifiers, code readability, comments, modular design		2
Use of observer pattern for character, map, and item containers (backpack/worn items, chest)		3
Use of builder pattern for character, map, and chest.		3
Total		**50**

Level-dependent characteristics: As a character goes up levels, the following are increasing: (1) his hit points go up by (1d10+constitution modifier), (2) his attack bonus goes up by one, and his number of attacks per round increase by one every five levels, according to the following table:

level	1 att/round
1	+1
2	+2
3	+3
4	+4
5	+5

level	2 att/round
6	+6/+1
7	+7/+2
8	+8/+3
9	+9/+4
10	+10/+5

level	3 att/round
11	+11/+6/+1
12	+12/+7/+2
13	+13/+8/+3
14	+14/+9/+4
15	+15/+10/+5

level	4 att/round
16	+16/+11/+6/+1
17	+17/+12/+7/+2
18	+18/+13/+8/+3
19	+19/+14/+9/+4
20	+20/+15/+10/+5

The attack bonus is calculated according to the base attack bonus (see above) and the ability modifier (for melee weapons, use the strength ability modifier; for ranged weapons, use the dexterity ability modifier). The attack bonus is used in the combat sequence to determine if a successful hit is happening.

weapon type	attack bonus
melee (e.g longsword)	base attack bonus + strength modifier
ranged (e.g. longbow)	base attack bonus + strength modifier

The ability modifiers are calculated from the baseline of a value of 0 for an ability value of [10-11] and decrease by 1 for each ability value of 2 less (i.e. [8-9] is -1, [6-7] is -2, ... , [0-1] is -5). As the minimum ability score is 0, the minimum ability modifier is -5. Similarly, the ability modifier increases by 1 for each ability value of 2 more (i.e. [12-13] is +1, [14-15] is +2, [16-17] is +3, etc). As there is no upper limit to the ability scores values, there is no upper limit to the ability modifiers.

The armor class is calculated according to the dexterity modifier and the armor and shield worn by the character: AC = 10 + (dex mod + armor mod + shield mod). The armor modifier depends on the type of armor the character is wearing and ranges from +1 to +8 (see below).

armod mod	armor
1	padded
2	leather
3	studded leather

armod mod	Armor
4	chain shirt
5	breast plate
6	banded mail

armod mod	armor
7	half plate
8	full plate

The shield modifier applies if you are wearing a shield and is +1, +2 or +4 depending on the type of shield (see below).

shield mod	Shield
1	Buckler
2	heavy shield
4	tower shield

Any armor or shield can have a magical modifier (+1 to +5) that will add to its armor/shield modifier.

The game sequence is turn-based. Every turn, each participant (player or monster) gets to do an action. At the beginning of every turn, an initiative roll is made by each participant (1d20 + dexterity modifier). The values of each roll determines the order into which each participant will get his turn. Each participant is doing their allowed action each turn, which may involve movement (i.e. moving a maximum of 6 squares) and/or attacking. When an attack is declared on a target, 1d20 is rolled and added with the attack bonus of the attacker. If the result is greater or equal than the armor class of the defender, the attack results in a hit and hit points are deducted from the defender. Both a longsword and longbow will inflict 1d8 hit points of damage. Melee weapons' damage are adjusted with the strength modifier. Ranged weapons' damage inflict only their nominal damage and is not affected by strength nor dexterity. During an attack, the attacker is allowed a number of attacks proportional to its level, as shown on the table above. Melee attacks are allowed only when the attacker and defender are on adjacent cells. Ranged attacks are allowed from non-adjacent cells.

weapon type	damage	damage bonus
longsword (melee)	1d8	Strength modifier
longbow (ranged)	1d8	none

Once a player or monster has reached 0 or less hit points, he is declared dead. Once every participant has done his own action in the turn, a new initiative roll is made and a new turn starts. In order to demonstrate that your combat sequence is implemented properly using the d20 rules, you have to implement a logging window into which the user can clearly follow step-by-step what is happening during the game showing the calculations happening in order to determine successful hits and damage inflicted, showing all dice rolls and modifiers involved in the calculation.

The playing sequence to be demonstrated in this build is the following: (1) select a map and a player character; (2) as the game starts, the map is to be adjusted automatically to the level of the character entering the map, i.e. the monster on this map should be the same level as the player character; if there are multiple monsters on the map, their levels should add up to the level of the character; (3) upon entering the map, the player character is placed on the entry point; (4) the game follows the turn-based game sequence as described above, including moves and attacks; (5) the player character defeats the monster(s) following the d20 rules; (6) the player character exits the map and automatically goes up a level and is saved automatically.

Chest and items: A chest contains magical items usable by a character. Upon opening the chest, the character can select items in the chest and put them in his own inventory. Items can be of the following types: helmet, armor, shield, bracers, ring, belt, boots, sword, bow. Only one item of each type can be worn at a time. Each magical item has a +1 to +5 modifier that can affect the character in different ways as listed below.

Item	May increase either
Helmet	Intelligence, Wisdom, Armor class
Armor	Armor class
Shield	Armor class
Bracers	Armor class, Strength
Ring	Armor class, Strength, Constitution, Wisdom, Charisma
Belt	Constitution, Strength
Boots	Armor class, Dexterity
Sword, Bow	Attack bonus, Damage bonus