

Bones Beneath

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Executive summary

Bones Beneath is a fun and engaging archaeology game centered around digging for treasure and bones while playing mini-games. It is a stand-alone application with GUI- support for a user-friendly experience. Users will have personal accounts that store their gold and track their progress throughout the game. As they collect gems and bones, players can sell the gems in the shop to earn gold and purchase upgrades that enhance gameplay. The core objective is to gather gems to buy new tools for further progression and collect bones to complete a dinosaur skeleton. Once the skeleton is complete, the player has fully maxed out their gameplay, offering a rewarding and structured play experience.

Document Version History

Date	Owner	Comment
10.2.24 10.10.24	Harris	Executive Summary, updated feature discussions, added use cases
10.2.24 10.9.24 10.10.24	Zahara	User Stories, updated feature discussions, updated use cases, updated feature discussion, updated feature matrix, updated executive summary, updated table of contents Updated feature matrix table of contents, and feature descriptions
10.2.24	Cori	Feature Matrix, updated executive summary, updated table of contents, updated use cases.
10.2.24	Meghan	Feature discussions, updated executive summary, added use cases, updated user stories

User stories

- Sara, a curious gamer

As an avid gamer who loves to try new and unique games on the market, Sara wants to play a game with lots of levels, and exciting aesthetic features so that she can have a new go-to game.

- Saam, a middle school teacher

As a middle school teacher searching for an engaging way to introduce his students to career paths, Saam wants to find a game inspired by archeology so that he can add it to career-related learning activities.

- **Janelle, a young aspiring archeologist**

As a young aspiring archeologist, Janelle wants to play an archeology game so that she can have more hobbies related to archeology and dinosaurs.

- **Emily, a puzzle lover**

As a lover of all sorts of puzzles, Emily aims to expand her knowledge of puzzle solving and find new ways to learn about solving mini games and exploring in a fun and engaging way.

- **Jason, a history student**

As an avid history enthusiast, Jason has always had a love for all things prehistoric and wants to find a new game where he can continue learning about what it is like to unearth the past.

- **Carlos, a parent of two kids**

As a parent of two young kids, Carlos has been on the hunt for a fun and engaging game for his kids to have an educational experience through learning about the past.

- **Kylie, a young paleontology fan**

As a dinosaur lover, Kylie wants to collect and assemble dinosaur bones in order to create a huge skeleton of her favorite dinosaur.

Feature Matrix

ID	Priority	Feature Name
S1	H	Login/Create User
S2	H	Database with saved accounts
S3	H	Select playable character
S4	H	View user profile/item inventory
S5	H	Purchase inventory items
S6	H	Excavate bone minigame
S7	H	Sell inventory item
S8	H	Keyboard-Controlled 2D Character
S9	H	Random level generator
S10	H	2d Map Tile system: breakable, nonbreakable
S11	H	Automatic user data save
S12	H	Stand-alone application
S13	M	GUI Support

ID	Priority	Feature Name
S1	H	Login/Create User
S14	H	Error-handling
S15	M	Bone Display / Scrapbook
S16	M	Multiple Minigames
S17	H	Enemies
S18	H	Enemy Factory

Feature Discussion

S1 - Log In / Create User button

Users will be able to create a new account under which their data will be stored, or log into an existing account, in which their previous data will be accessible and able to be continuously updated as they progress. The button will take the user to the hub / profile page if they are logging in and have already created a profile, or the Choose Character screen to create their profile which will ultimately be stored under their username login.

S2 - Database with saved accounts

There will be a database that saves the information of a user under their username such as their levels completed, stats, coins, percentage of dinosaur completed, inventory, etc. The database will be created and updated by reading and writing to a file. These will all be stored and accessible as the player progresses through the game and saves the information when they log out.

S3 - Select Playable Character

Users will be able to select a character from four different character options. Selecting a new character is purely aesthetic and does not change the user's inventory or currently saved database information.

S4 - View User Profile / Item Inventory

The main hub, where the user can view their profile, their stats, and the current items in their inventory is the main “hub” screen. This screen will be continuously updated throughout the game behind the scenes so that it is up to current date whenever the user clicks on it.

S5 - Purchase Inventory Items

Users will collect gems while digging in the ground, and each type of gem is worth a certain amount of money in which they can go into the shop and sell their gems to gain money. Each item will have a set cost. The user will only be able to purchase items as long as they have a sufficient amount of gems. Once an item has been purchased, the user's coins will decrease accordingly and the user's inventory will be

updated with the item. If the user's inventory is full the user won't be able to purchase more items until space is made available by using previously purchased items.

S6 - Excavate Bone Minigame

In order to collect a bone that the user may come across, they must complete a minigame, and score a certain amount of points in order to successfully excavate and obtain the bone. If they are not able to score the certain amount of points, then they are not able to obtain the bone, and the bone will become broken and therefore unusable. As the bones are successfully obtained, they are then added to the scrapbook where the skeleton of a dinosaur is continuously being built, updated, and stored, until all the bones have been successfully collected and the skeleton is complete.

S7 - Sell Inventory Item

Users will collect gems while digging in the ground, and each type of gem is worth a certain amount of money in which they can go into the shop and sell their gems to gain money. These inventory items will be stored using a database in which they are accessible throughout the game to purchase items to improve gameplay.

S8 - Keyboard Controlled 2D Character

The user will be able to control the character's movements and digging using the keyboard. Movements include moving right, moving left and jumping. The character will move on a 2D grid with basic physics like gravity.

S9 - Random Level Generator

The difficulty of the level will be randomly generated, and the user will not be able to adjust the level of difficulty for each round. This will be done by randomly creating the tile map, enemy spawns and item spawns for a unique level layout.

S10 - 2D Map Tile System: Breakable, Non-breakable

The player character will navigate a 2d grid of breakable and unbreakable blocks to dig through and explore. This tiled map will serve as the level for the main digging game, and will be randomly generated of premade tiles. By digging these tiles the user has a chance of collecting gems, or finding bones.

S11 - Automatic user data save

User data will automatically be updated and saved to the database as the game progresses. A user's data will be tied to their account.

S12 - Stand-alone Application

This game will be a stand-alone application and will not require external materials, payment, or an internet connection to function. The application will be self-contained and will function by downloading and running the program.

S13 - GUI Support

This application will support a graphical user interface (GUI) which will be the user's primary form of interaction with the application. The GUI will include multiple interactable elements such as buttons and

textboxes. The GUI will also be responsive to certain keyboard actions.

S14 - Error-handling

The application will be equipped with thorough error-handling ability especially concerning user input. The application will detect, manage, and resolve errors appropriately to ensure smooth operation. The user will be notified of invalid input if the error is required to be reported to be resolved.

S15 - Bone Display/ Scrap Book

The game will have a scrapbook screen that displays a skeleton that the player can fill in by collecting bones in the excavation level. This will be the primary progress tracking system for the game, by completing the skeleton you will win the game.

S16 - Multiple Minigames

Two more MiniGames will be created so that when the user comes across a bone, one of the three minigames will be randomly chosen and the user must then complete the MiniGame in order to successfully collect the bone. If the MiniGame is not successfully completed either in the correct amount of time or collect enough points, then the user will not be able to collect the bone.

S17 - Enemy

We will add enemies to the excavation level that can move around and hit the player causing them to drop some of their collected coins. Additionally the player will also be able to kill the enemies to eliminate the threat.

S18 - Enemy Factory

We will implement a Factory Design Pattern to create an EnemyFactory that generates different kinds of enemies with varying levels of damage and different sprites.

Use Cases

Use Case 1

Use Case Name	Creating new user
Summary	A user selects play on the opening screen and chooses the create user option.
Rationale	First-time users should be able to set up a new account. Setting up a new account will carve out space in the database for the new user allowing them to log into the game the next time they play and store their progress.
Users	First-time players
Preconditions	It is the user's first time creating an account with this unique username and

	password combination. (i.e. Trying to create an account that has been previously created is not allowed)
Course of events	<ol style="list-style-type: none"> 1. The user opens the game and selects the play button. 2. The user is brought to the login/create user screen 3. The user selects create user 4. The user enters a unique username and password 5. The user is brought to the "Choose Character" screen 6. The user selects a character 7. The user is brought to the hub page and the selected character is displayed with default attributes.
Alternative paths	If the user enters a username that already exists, a message such as "Username already taken, please enter a new username" will appear. If the user chooses to cancel creating the user at any point, no changes will be saved.
Postconditions	A new account with a specific username and password will be created into the database. The user's progress and character details will be saved under the new account information. The user is logged into their account and taken then to the choose character page.
Exception	If the system doesn't connect properly to the database when creating the account, an error message like "Unable to create account at this time. Please try again later" is shown, and no account is created. If the username or password entered do not match, a message such as "Invalid username / password" will appear. If the system fails to create or store the new account, a message such as "Account creation failed, please try again" will appear.

Use Case 2

Use Case Name	Collect Artifacts
Summary	The user explores and digs through various tiles in the game world to discover artifacts. These artifacts are essential to game progression and are stored in the player's inventory once collected.
Rationale	Artifacts, such as bones and gems, are core components of the game. Finding and collecting these artifacts drives the player's progress in the game.
Users	Players who are digging through levels
Preconditions	The player is actively exploring the excavation level, there are hidden artifacts buried within the tiles, the player has sufficient space in their inventory to collect the artifact.
Course of events	The player controls their character and digs through tiles. The player discovers an artifact — either a bone or a gem. A notification informs the player of the discovery
Alternative paths	Digging through different tiles will yield different artifacts.
Postconditions	The artifact is automatically added to the player's inventory.
Exception	If the excavation level should fail for any reason, we will return the player to the player profile screen.

Use Case 3

Use Case Name	Selling the gems in the shop
Summary	After the user has collected gems from digging and coming across the gem blocks, they visit the shop screen and intend to sell their gems to get “gold,” the currency of the game. They can then use the gold made from the gems to purchase items to further improve their gameplay.
Rationale	In order to buy items to progress their gameplay and continue to further increase their player profile, the user must sell the gems that they discover throughout the game to obtain the money.
Users	The player in the game who collects gems and sells them for gold.
Preconditions	The player has collected gems and has at least one in their inventory to sell. The player has pulled up the shop screen. The shop is functioning correctly.
Course of events	Player selects the “shop” option to access the shop screen. The screen displays and the player is able to see their inventory with the gem(s) in it. The player can choose which gems to sell. The shop system will then calculate the total value of the gems, and return to the user that amount of gold. The player is able to see the gold on their screen. The gems are deducted from the player's inventory.
Alternative paths	

Use Case 4

Use Case Name	Control Player Movements
Summary	Control the player character through a 2d world with basic physics . The player character can run and jump as well as destroy/dig blocks and pick up items, as triggered by keyboard inputs of the user.
Rationale	In order to interact with the game world the user needs the ability to directly control a digital avatar and move them through the game world.
Users	Players
Preconditions	1.Player Hhas an account and is logged in 2. Player Presses play button from profile screen
Course of events	1.Spawn into Game world 2.User presses buttons 3. Player moves based on keyboard inputs 4.Repeat from 2
Alternative paths	2. Presses different button 3. Player moves in different direction
Postconditions	Character changes location in game world and screen is updated
Exception	If a player presses an unassigned button, nothing happens. If the excavation level should fail for any reason, we will return the player to the player profile screen.

Use Case 5

Use Case Name	Fighting enemies
Summary	Inside the excavation level, while looking for gold, gems and bones, player will encounter enemies that can hit you, losing the player coins. Players can kill enemies by landing on top of them, similar to mario.
Rationale	We want enemies to add some level of difficulty to the excavation level which is currently harmless and devoid of any consequences.
Users	Players in the Excavation level
Preconditions	1. Player has an account and is logged in 2. Player Presses play button from profile screen
Course of events	1. Spawn into Game world 2. User finds and navigates to an Enemy 3. User jumps on and kills the enemy.
Alternative paths	3. User is hit by the enemy and loses coins
Postconditions	The player will stay in the Excavation level and continue game play.
Exception	If the excavation level should fail for any reason, we will return the player to the player profile screen.

Use Case 6

Use Case Name	Playing MiniGame
Summary	The user comes across a bone in the main game while digging, in order to collect the bone one of three possible minigames will come up, and the user must now complete the minigame successfully in order to actually obtain the bone. The minigames vary in how it will be completed successfully, such as in a certain amount of time or collecting enough points.
Rationale	We want to add a certain level of difficulty to extracting and obtaining the bones because realistically, archaeologists spend lots of time meticulously extracting bones, and there are cases in which they accidentally break the bone in the process, therefore unsuccessfully fully obtaining it.
Users	Players in the game.
Preconditions	1. Player has an account and is logged in 2. Player Presses play button from profile screen 3. Player presses Start Game button from the hub 4. Player digs and comes across a hidden bone block
Course of events	1. Spawn into Game world 2. User navigates the world and finds a bone block 3. MiniGame window pops up 4. User plays the game User successfully beats it and gets the bone
Alternative paths	3. User fails the game and breaks the bone, therefore being unable to obtain it
Postconditions	The player will stay in the game and continue playing, finding more blocks
Exception	If the MiniGame window fails to show up, the user gets the bone.