

“Build Bill”

HW3: Scratch project proposal by

COMP 725 / 825

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Summary

Dig Dug was an iconic arcade game released in 1981. *Build Bill* will be a tribute to *Dig Dug* with some significant changes. In *Dig Dug* the player's goal is to earn as many points as possible, and the game ends when the player runs out of lives. In this regard, *Build Bill* will be the same. Gameplay in *Dig Dug* progresses through a series of stages. Each stage appears as a cross-section of earth and Dug, the player's character, digs tunnels as they navigate throughout the stage. In this regard, *Build Bill* will be different. Bill will build walls. Just as enemies are able to follow Dug through his maze of tunnels, Bill's enemies will pursue him through the maze Bill creates. In *Build Bill*, just as in *Dig Dug*, a stage will be cleared when all enemies are defeated; however, Bill has the added challenge of being able to box himself into a dead-end

Description

Each game will begin with an instruction dialogue then a title splash screen. Each stage will comprise of four concentric square "rings" denoting different point zones for defeating enemies. The outer ring is worth 2x. The next ring in is 3x, then 4x, and the center is 5x. Stages will begin with Bill in the center, a random number (4-8 inclusive) of enemies, and a random number of EMPs (2-5 inclusive). Enemies and EMPs will take random positions with some restrictions; for example, minimum distance.

There are two types of enemies. BeepBops will harm Bill when they touch them. BeepBops can intermittently phase through walls. Boopzerkerz will also harm Bill when they touch them or by spraying them with toxic sludge. Boopzerkerz can melt walls from time to time.

One tool Bill has for defeating enemies is an EMP. If Bill touches an EMP, once he leaves contact it will begin its countdown. After a short wait, the EMP will destroy all characters within its range. Bill will have a small margin to escape. Bonus points will be awarded if multiple enemies are destroyed by a single EMP. Once two EMPs are activated, a battery pack will appear in the center of the stage. Bill can collect the battery pack for bonus points before it disappears.

Bill has another tool for defeating enemies: his ZapBlaster(TM). Bill's ZapBlaster(TM) will have a limited range and takes some time to completely defeat an enemy; however, it will stun any enemy that is not defeated. Bill's ZapBlaster(TM) has unlimited uses.

Whenever Bill is harmed, the player loses a life. Bill respawns in the center of the stage and the remaining enemies return to their starting positions. Walls and EMPs will remain just as they were. When the player runs out of lives, the game is over. The player will regain lives (up to a max of 4) when they reach certain point thresholds.

As the game progresses, enemies will become faster, more numerous, and will use their special abilities more often.

The stage will be broken into a grid. All character sprites will be 1 unit x 1 unit. Bill will travel on the lines of the grid and enemies will travel in the spaces. This will allow the enemies to travel between the closest parallel walls and provide a manageable finite resolution.

Algorithm

- Game Instructions
 - Instructions will be displayed as a stage background. The game will wait for the user to press the space bar before moving on to the title screen. The following instructions will be given:
 - Arrow keys to move
 - Spacebar to fire ZapBlaster(TM)
 - Destroy enemies by zapping them or blasting them with EMPs
 - To zap monsters:
 - Press spacebar to stun- hold to fry
 - Enemies are worth more points at inner areas.
 - Activating EMPs:
 - Touch EMPs to arm
 - Destroy multiple enemies with each EMP for highest score
 - Horizontal Scoring
 - BeepBops 200-500
 - Boopzerkerz 400-1000
 - Vertical Scoring
 - BeepBops 200-500
 - Boopzerkerz 200-500
 - Title screen will display until the player presses the space bar
- Game Play
 - Stage is colored with four zones
 - Zones are concentric bands of equal thickness
 - Bill begins in the center of the stage
 - Enemies are populated
 - $\text{number_of_enemies} = ((\text{level} + 1) // 2) * \text{rand}(1, 4 \text{ inclusive})$
 - Min of 4
 - Max of 8
 - Min distance from Bill is 1/8 stage width
 - Record starting positions for reset
 - EMPs are populated
 - $\text{number_of_EMPs} = ((\text{level} + 3) // 4) * \text{rand}(1, 4 \text{ inclusive})$
 - Min of 2
 - Max of 5
 - Location
 - Min distance from Bill is 1/16 stage width
 - min distance from each other is 1/8 stage width
 - Set game mechanics

- bill_speed = x
 - enemy_speed = (.9 + 2 * level / 100) * x
 - enemy_ability_frequency = (101-level)
 - Min of 6
- o Game loop
 - Check for enemies
 - If 0, new stage
 - If 1 → Enemy attempts escape
 - If > 1 → pass
 - Search for user input
 - Fire Blaster
 - o If blaster is active → harm enemy
 - if enemy is destroyed
 - Destroy enemy
 - Calculate points & award
 - o Extend blaster bolt to range
 - o If enemy is hit
 - stun enemy
 - harm enemy
 - Move Bill
 - o If Bill hits wall, do nothing
 - o If Bill hits enemy & not stunned
 - Destroy Bill
 - Decrement lives
 - If lives==0 → game over
 - Reset stage
 - o Update Bill position
 - o Build wall & award points
 - Check EMPs
 - If Bill is touching → arm
 - o Set countdown
 - If Bill is not touching & armed | countdown < starting value → decrement countdown
 - If countdown = 0 → detonate
 - o Destroy any character within range
 - o Calculate & award points
 - Increment EMP detonations
 - o if detonations == 2 → create battery
 - Move enemies
 - Check for special ability activation
 - o if rand (1, enemy_ability_frequency inclusive) == 1 → activate
 - If enemies > 1 Move enemies towards Bill
 - o If wall, change direction
 - If enemies = 1 Move enemies towards stage edge

- o If wall, change direction
- o Destroy Enemy
 - Hide sprite
 - Turn off collisions
 - Decrement enemy counter
- o Destroy Bill
 - Blink all characters
 - Decrement life counter
 - If lives == 0 game over
 - Reset character positions
 - Restart game loop
- o Special ability
 - BeepBops
 - Change sprite
 - Move directly toward Bill
 - Ignore walls
 - Boopzerkerz
 - Blink
 - Spew sludge
 - o Hide wall
 - o Harm Bill
- o Battery
 - Start a timer
 - when timer == 0 hide battery
 - if Bill touches battery → award points

Diagrams/Screen Dumps



Gameplay from the original Dig Dug.

- Differences:
 - Concentric point zones instead of vertical
 - Build wall that prevent characters from crossing instead of tunnels to contain characters
 - “Rocks” will behave differently