**Test Plan**

*In your /doc folder, upload a test plan that outlines how to user-test your game, title the document: test-plan.docx. For example, what keys to press or what mouse actions are necessary. The TAs will use this short document to test and mark your game.*

**Startup and Main Menu Tests**

1: Logo Animation

* Precondition:
  + Game is launched after building and running ./amoebash
* Test Steps:

1. Start game
2. Observe initial animation

* Expected Result:
  + Logo/text slides in from the left and settles at the center
  + During animation, all buttons are inactive and clicks are ignored

2: Shop Button Functionality

* Precondition:
  + Main menu active and logo animation completed
* Test Steps:

1. Hover on button to see asset change
2. Click button located below start button
3. Verify that in shop menu you see 6 item slots, a shopkeeper and costs for items
4. Click back button on bottom left to go back to main menu

* Expected Result:
  + First click of button should display shop screen
  + Second click should hide shop screen, display main menu again
  + Each click on a button should play a sound

3: Info Button Functionality

* Precondition:
  + Main menu active and logo animation completed
* Test Steps:

1. Click button located at bottom of screen
2. Verify that in info screen - See info letter from devs
3. Click back button on bottom left to go back to main menu

* Expected Result:
  + First click of button should display info screen
  + Second click should hide info screen, display main menu again
  + Each click on a button should play a sound

4: Start Button and Game Start Animation

* Precondition:
  + Main menu active and logo animation completed
* Test Steps:

1. Click start button located at center of screen underneath logo
2. Observe animation
3. Load into game screen

* Expected Result:
  + Animation should play showing nucleus moving from left to right into a nose
  + Note the variants of the animation, where the nose changes color / texture / added accessories / etc.
  + After animation, should transition to game mode
  + Background music should start playing

**UI Functionality**

1: Shop

* Precondition:
  + In shop screen and you have sufficient germoney
* Test Steps:
  + Click on a buff to purchase
  + Load into game screen
* Expected Result:
  + You should see the funds deducted from player money count
  + You should see the buff on the screen at the start of the next run

**Audio**

1- Switching between boss versus regular levels in gameplay change audio between boss track and regular

* Precondition:
  + User has started the gameplay
* Test Steps:
  + Progress from level 1-5
  + Levels 1, 2 and 4 should use theme, whereas 3 and 5 should use boss theme (listen)
* Expected Result:
  + You should hear the correct theme

2- Clicking and Purchasing should have special sounds

Precondition:

* + User is in shop menu
* Test Steps:
  + Purchase a buff, and you should hear a purchase\_sound
  + Click back button and you should hear click\_1 sound
* Expected Result:
  + You should hear the correct sounds

**In-Game Functionality**

1: Tutorial Screen

* Precondition:
  + First time loading game
* Test Steps:

1. Click start button and wait for intro cutscene to finish
2. Move mouse around the game window
3. Verify that main character always rotates to point towards mouse cursor and slowly hovers towards mouse direction if mouse is far enough from character
4. Click in any direction on game canvas
5. Observe the lazy camera follow, and also parallax movement of background
6. Traverse through the map and pick up “?”- looking buffs.
7. Enter portal at the end of the map.

* Expected Result:
  + When mouse is far enough from character, it moves towards the mouse at a constant speed
  + After clicking, character should dash towards mouse direction, accelerating and then decelerating, and returning to previous velocity
  + Dash sound should play when clicked
  + Camera should follow the character as it moves
  + Once interacting with “?”, a pop up describing instructions will be rendered.
  + Taking the portal will let you enter the game.

2: Grid, Camera, Procedural Map, Minimap Behavior

* Precondition:
  + Gameplay has started after logo and intro cutscene and tutorial complete
* Test Steps:

1. Move / click the mouse around the screen to make nucleus move around on map
2. Move nucleus towards edges of map, and notice bounds of map

* Expected Result:
  + Minimap of map should always display the current tile character is on with a blue square
  + Minimap should not show the whole map at once, but should update as the player explores new regions and show those
  + Portal should show up as yellow tile on the mini map

3. Collision Behavior

* Precondition:
  + Either in Gameplay or Tutorial stage, after logo and intro cutscene complete
* Test Steps:
  + Click around the screen to make player move around on map
  + Move player near walls, and try to dash into walls
  + Move player near enemies, move around, and see how the enemies interact with the walls
  + Dash into an enemy near a wall and see how the buff interacts with the wall
* Expected Result
  + Player should not be able to enter the wall, both while moving normally and while dashing
    - Player’s original speed is conserved in the direction not blocked by wall
      * Eg - If the wall is horizontal, the player won’t be able to move upwards into it, but depending on dash angle, the horizontal component of their speed is preserved
  + Enemies should not be able to enter walls while avoiding or moving near the player
  + The tutorial key should not be able to enter the wall even if the player tries to move it into a wall
  + Buffs should not be able to enter walls even if they spawn near a wall

3: Enemy Interaction [Spike Enemy]

* Precondition:
  + Gameplay has started
* Test Steps:

1. Explore map and find enemies in map
2. Observe enemies movement pattern from a distance, and notice tracking once you get close to enemy
3. Dash into enemy sprite

* Expected Result:
  + When at a distance from enemy, will hover in patrol mode
    - It should move back and forth horizontally
  + When in proximity to enemy, enemy will chase player
  + When dashing into an enemy, the enemy will first be knocked back.
  + When HP reaches below zero, the enemies are killed, particles show and absorbed by the player. And a corresponding sound effect is played along with buff drop

4: Enemy Interaction [Red Blood Cell (RBC)]

* Precondition:
  + Gameplay has started
* Test Steps:

1. Explore map and find enemies in map
2. Observe enemies movement pattern from a distance, and notice tracking once you get close to enemy
3. Dash into enemy sprite

* Expected Result:
  + When at a distance from the enemy, it will float around in a randomized direction every few seconds.
  + When in proximity to enemy, enemy will run away from character
  + When dashing into an enemy, the enemy is killed and a corresponding sound effect is played with buff drop
    - When HP reaches below zero, the enemies are killed, particles show and absorbed by the player. And a corresponding sound effect is played along with buff drop

5: Enemy Interaction [Bacteriophage]

* Precondition:
  + Gameplay has started
* Test Steps:

1. Explore map and find enemies in map
2. Observe enemies movement pattern from a distance, and notice tracking once you get close to enemy
3. Dash into enemy sprite

* Expected Result:
  + When at a distance from enemy, will be patrolling
  + When in proximity to enemy, enemy will orbit around player shooting projectiles
    - Multiple bacteriophages will arrange themselves around the player in a circle with constant radius
  + A sound is played when each projectile is shot
  + When dashing into an enemy, HP reduces. When HP reaches below zero, the enemies are killed, particles show and absorbed by the player. And a corresponding sound effect is played along with buff drop

6: Enemy Interaction [Dendrite]

* Precondition:
  + Player has reached second last level (level 4)
* Test Steps:

1. Explore the map

* Expected Result:
  + Dendrites will move towards the player via A\* path finding.
  + Once they find the player they will pierce through and start shooting towards the player.
  + HP will reduce upon hit from dendrite.
  + When dashing into an enemy, HP reduces. When HP reaches below zero, the enemies are killed, particles show and absorbed by the player. And a corresponding sound effect is played along with buff drop

7: Enemy Interaction [Mitosis Boss]

* Precondition:
  + Player has reached BOSS\_LEVEL
* Test Steps:

1. Progress game to reach BOSS\_LEVEL (set as 3 for now)
2. Observe boss patterns which are randomly chosen.
   1. Observe FLEE which makes the boss run away.
   2. Observe RUMBLE where the boss charges into the player, knocking back the player and dealing damage.
   3. Observe GUN\_PARADE where the boss shoots projectiles in 12 directions.
      1. Projectiles reduce size by half per split.
3. Observe the boss split into two when reaching a certain health threshold.
   1. Currently can split three times. So observe 4 different versions of boss.
   2. Health and size reduces to half and assets change.

* Expected Result:
  + When at a distance from the boss, the boss won’t do anything.
  + When in proximity to the boss, the boss will randomly switch states and perform the actions mentioned above.
  + When the boss reaches half of its total health, it will split into two.

8: Enemy Interaction [Brain Boss]

* Precondition:
  + Player has reached FINAL\_BOSS\_LEVEL
* Test Steps:

1. Progress game to reach BOSS\_LEVEL (set as 5)
2. Observe patterns: Brain boss will go through three patterns: spawn, shoot, tired.
   1. Shoot / Dash boss in non-tired stage.
3. Attack brain boss to trigger different phases (making health ⅔ and ⅓ of original).

* Expected Result:
  + When at a distance from the boss, the boss won’t do anything.
  + When in proximity to the boss, the brain boss will start by spawning dendrites on the map to attack you.
    - Per phase, the amount of dendrites increases.
  + Upon killing all dendrites, the boss will start shooting for a certain period.
    - Projectiles change per phase. E.g. straight, spiral, following eyeball.
  + Once it is tired, the player can inflict damage.
    - On non-tired stages, projectiles will be reflected and player wouldn’t be able to damage by dash.

9. Player Enemy Interaction for Damage

* Precondition
  + Gameplay has started after logo and intro cutscene
* Test Steps
  + Explore map and find enemies in map
  + Get close in attack range so enemies start attack
* Expected Result
  + For attack-able enemies, when they attack, player HP should reduce
  + When player HP reaches 0, gameplay should shift to the gameover screen showing the nucleus screen to let the user pick which buffs to carry on.
    - A sound should play upon player death
    - Game should not be playable after reaching 0 HP
    - Enemy damage should be inflicted

9. Buff System

* Precondition
  + Gameplay has started after logo and intro cutscene
* Test Steps
  + Explore map and find enemies in map
  + Attack enemies to collect buffs
* Expected Result
  + When enemies die, they should drop buffs
  + Buff UI should be placed on screen to indicate a buff dropped
  + Upon collecting a buff, the corresponding status changes should be applied
    - Upon collection, the buff icon should show up at the bottom
      * If buff already exists, only the count rendered increases.
    - Upon collection, a popup should show up for a few seconds containing the buff image, title, and a short description about what it does
    - Subsequent buffs should be added in a row next to the previous one
    - Upon collection, sound will be played.
  + Consumable buffs will not be rendered, or will be removed from list upon consumption.

10. Nucleus Menu

* Precondition
  + Player dies
* Test Steps
  + Move around the map and make player health reach below zero.
* Expected Result
  + When enemies die, the nucleus menu should show.
  + Buffs collected from the run should be displayed on the left side.
  + Click on a buff would insert buff in the nucleus, allowing it to carry on to the next run.
    - Clicking on it again will remove it and move it to the left side of the screen.

10. Progress Save

* Precondition
  + During Gameplay other than Tutorial / Boss Stage
* Test Steps
  + Click Space to go to pause screen and click button
* Expected Result
  + When clicking the button, progress should be saved to JSON.
    - Player Status + Motion
    - Map and Projectiles
    - Buffs collections
  + When clicking on save button in the tutorial or boss stage, progress shouldn’t be loaded.

**Keyboard Controls**

1: Pause Functionality (Spacebar)

* Precondition:
  + Game mode active
* Test Steps:

1. Press spacebar while in game
2. Attempt in game action such as dashing

* Expected Result:
  + Game pauses, and “PAUSE” text is overlaid over current game state in center of screen
  + Everything is stationary including player, enemies, background, etc.
  + Only possible actions are unpausing with spacebar, or restarting game (see next test)

2: Restart Functionality (R key)

* Precondition:
  + In any game state
* Test Steps:

1. Press “R” key

* Expected Result:
  + Game restarts, you are taken back to the main menu
  + On restart, the logo animation wont play, as logo should already be placed in the center

3: Game Over Functionality (O key)

* Precondition:
  + Game mode active
* Test Steps:

1. Press “O” key
2. Try any character action, try and clicks / key presses (except R key)
3. Press left mouse click or “R” key to restart game

* Expected Result:
  + After pressing “O,” game over screen is displayed with a black background and message centered
  + No actions should be possible, as character should not be displayed at all
  + Only possible action is pressing left mouse click or “R” key after which game should return to main menu

4: Projectile Shoot (S Key)

* Precondition:
  + Game mode active
* Test Steps:

1. Press “S” key

* Expected Result:
  + After pressing “S,” player will shoot projectile in mouse direction
  + Upon hit on enemy, the enemy’s health will reduce
  + Shooting effects are rendered on shoot.

5: Progress Load (L Key)

* Precondition:
  + Game Start Screen
* Test Steps:

1. Press “L” key
2. Try press “L” key in other screens

* Expected Result:
  + After pressing “L”, progress will be loaded into the game.
  + Upon clicking the start button, we would resume the saved data.