

DONKEY KONG



6.111 Design Project

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<http://www.classicgaming.cc>

• Project Overview

- Goal: Recreate the classic 1980's arcade game Donkey Kong
- Project Components
 - Game Logic
 - Game FSM
 - DK, Mario, Barrel, Collision Detector Logic
 - Display Logic
 - DK, Mario, Barrel, Princess, Background Modules
 - ZBT RAM Implementation of a Frame Buffer
- Possible Further Explorations
 - Video Detection Driven Motion

History

- Developed by Nintendo
- Designed by the legendary Shigeru Miyamoto
- Released in America in 1981
- Instant hit
- Considered by many to be one of the greatest games of all time
- Spawned spin-off games and became entrenched in American popular culture

http://en.wikipedia.org/wiki/Donkey_Kong_%28Arcade_Game%29



http://www.lacoctelera.com/myfiles/frikiplanet/donkey_kong_arcade.jpg

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Gameplay

CHILLS! THRILLS! TEST YOUR SKILLS!

DONKEY KONG

from Nintendo

EVERYONE'S GOING APE OVER DONKEY KONG!

"HELP! HELP!" cries the beautiful maiden as she is dragged up a labyrinth of structural beams by the ominous Donkey Kong. "SHORT! SHORT!" Foreboding music warns of the eventual doom that awaits the poor girl, lest she somehow be miraculously rescued. "But, wait! Fear not, fair maiden. Little Mario, the carpenter, is in hot pursuit of you this very moment."

Throwing fate to the wind, risking life and limb, or worse, little Mario tries desperately to climb the mighty fortress of steel, to save the lovely lady from the evil Mr. Kong. Little Mario must dodge all manner of obstacles—fireballs, plummeting beams and a barrage of exploding barrels fired at him by Donkey Kong.

Amidst the beautiful girl's constant pleas for help, your challenge is to maneuver little Mario up the steel structure, while helping him to avoid the rapid-fire succession of hazards that come his way.

As little Mario gallantly battles his way up the barriers, he is taunted and teased by Donkey Kong, who brazenly struts back and forth, beating his chest in joyful exuberance at the prospect of having the beautiful girl all to himself. It is your job to get little Mario to the top. For it is there, and only there, that he can win the mighty Donkey Kong to his mortal doom. Leaving little Mario and the beautiful girl to live happily ever after. "SIGH. SIGH."

So, if you want the most exciting, most fun-filled, most talked about family video game on the market, don't monkey around with anything but the original Donkey Kong.

LEARN TO PLAY DONKEY KONG

THE MOST EXCITING NAME IN VIDEO GAMES.

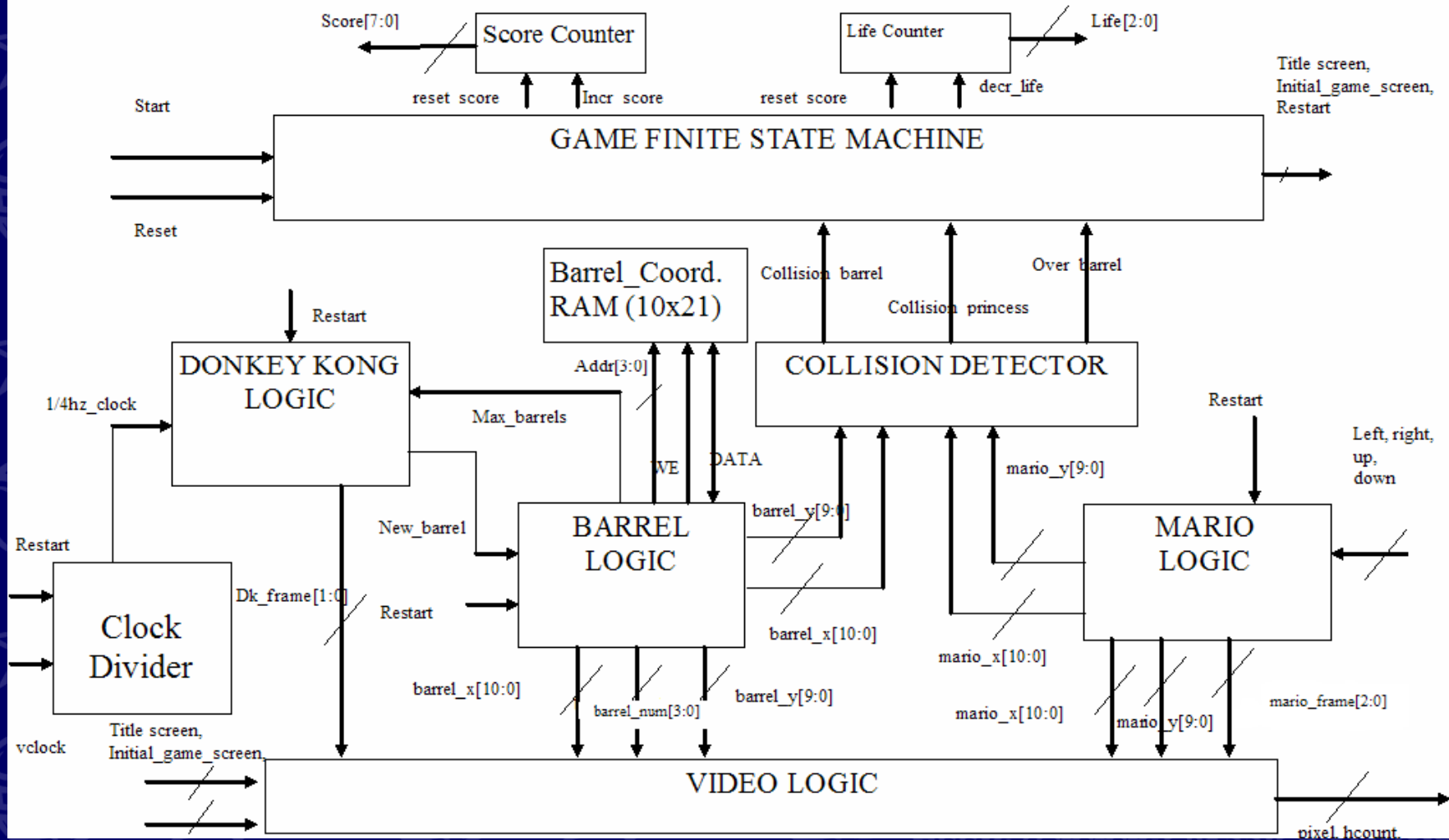
Nintendo

Nintendo of America, Inc.
1619 Route 90, East Fishkill, New York 12524
© 1982 Nintendo

- The user controls Mario with keyboard controls (the up, down, right, left arrows, and the space bar)
 - If time permits, we will implement motion control
- Mario starts at the lowest platform
- Pauline is trapped at the highest platform
- Mario (Jumpman) has to climb up a series of platforms to save Pauline, while Donkey Kong (who is at the top platform) throws barrels to impede Mario's progression
- Mario can jump over barrels and climb ladders to get to the next highest platform
- Once Mario loses all of his lives, the game is over
- When Mario reaches the Princess, the player wins the level

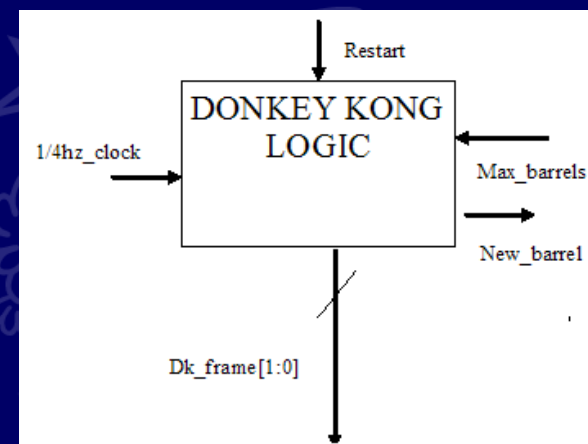
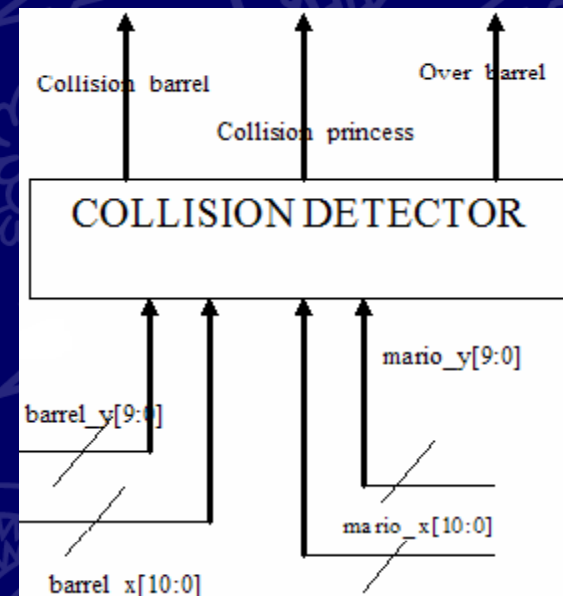
Block Diagram - Game Logic

BLOCK DIAGRAM FOR GAME LOGIC



Game Logic- Details

- Collision Detector
 - Determines whether Mario collides with a barrel, jumps over a barrel, or reaches Pauline
- Donkey Kong Logic
 - Uses the 1/4 Hz clock to determine when to try to throw another barrel (if max_barrels is not one)



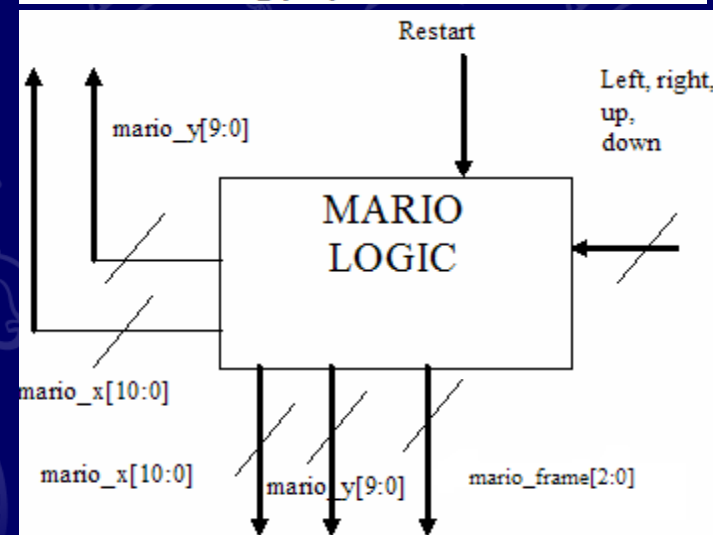
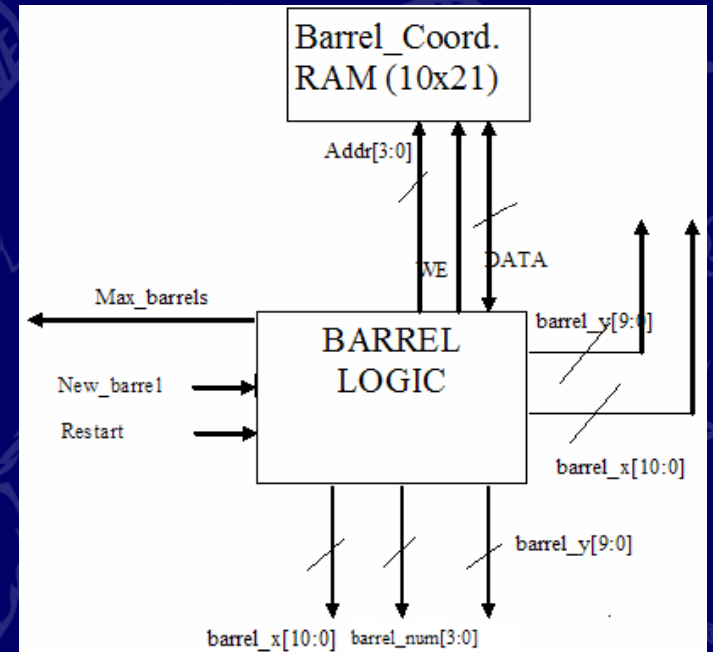
Game Logic- Details

- **Barrel Logic**

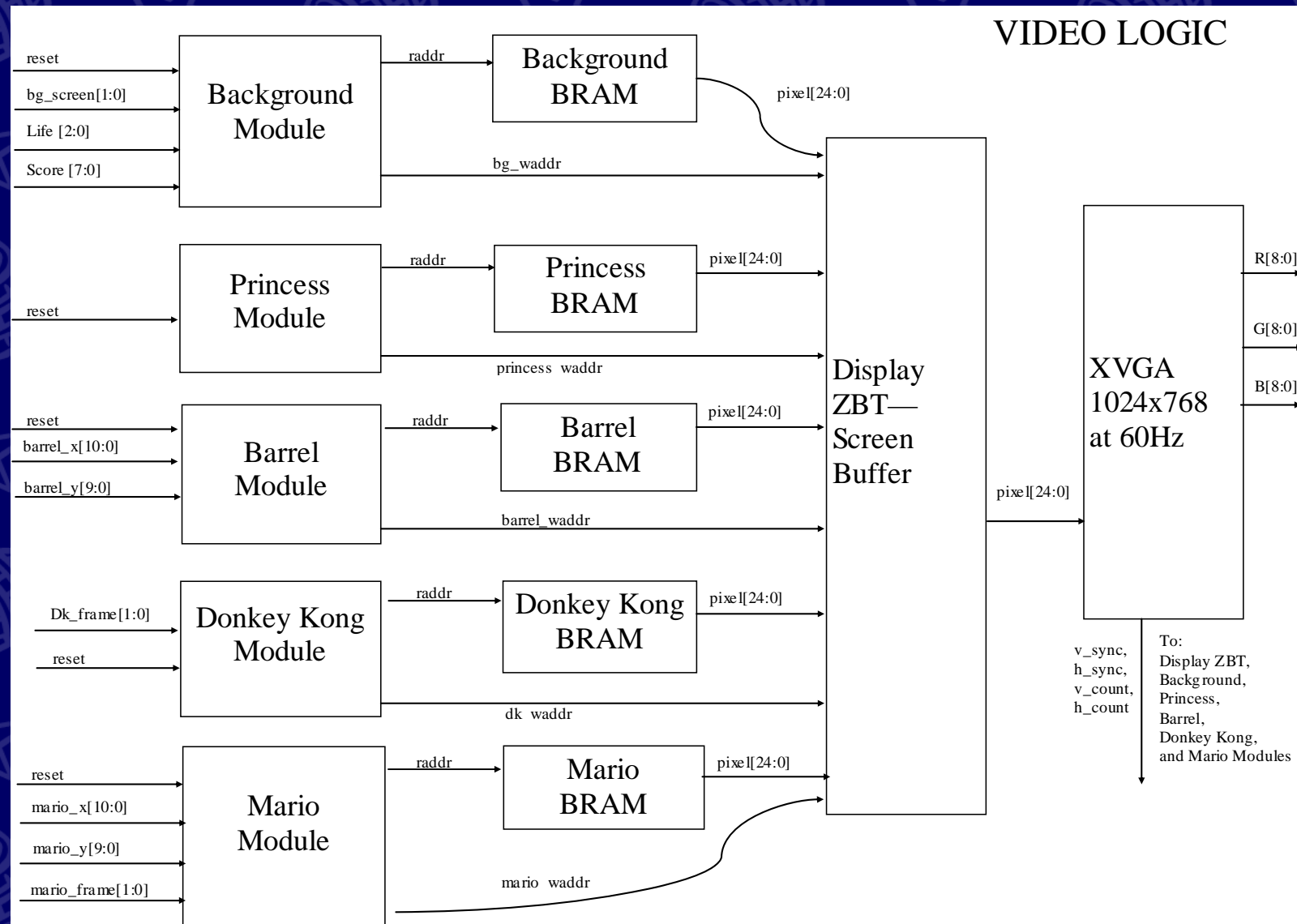
- Writes/Reads the coordinates of each barrel from a 10x21 RAM
- Creates a new barrel when told so by Donkey Kong Logic
- Tells Donkey Kong Logic when there are the maximum number of barrels onscreen
- Sends the coordinates of each barrel to the Video Logic and the Collision Detector

- **Mario Logic**

- Takes the control inputs from the user and gives the Collision Detector and Video Logic the coordinates of Mario
- Also tells the Video Logic which frame of animation to use for Mario



Block Diagram - Display Logic

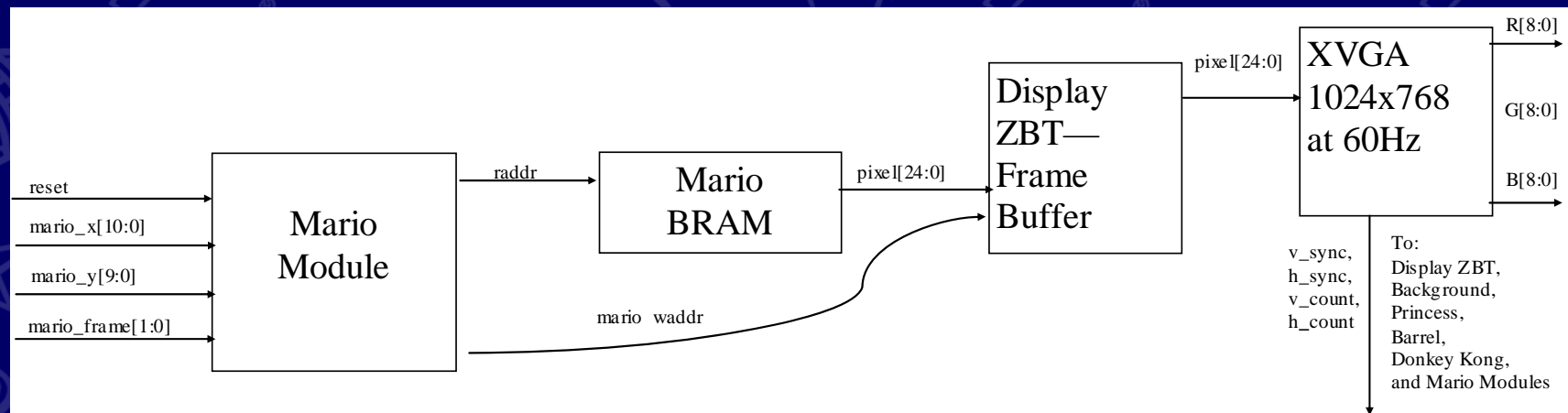


Display Object Specifications

- Donkey Kong
 - 32x64 pixels
 - 3 frames of animation
- Peach
 - 32x64 pixels
 - 2 frames of animation
- Mario
 - 16x32 pixels
 - 4 frames of animation
- Barrels
 - 16x16 pixels
- Background: Platforms, Life & Score Display
 - Spacing between platforms = 64 pixels
 - Each platform height: 32 pixels
 - Each repeating unit: 32x32 pixels

RAM Implementation – Mario Example

- Each of the 4 animation frames stored in a BRAM
- Mario module
 - Inputs: <mario_x>, <mario_y>, <mario_frame>
 - Outputs:
 - <raddr> - which animation frame to load from BRAM
 - <mario_waddr> - where this is placed in the frame buffer
- Frame Buffer – each location maps directly onto a pixel on the monitor



Proposed Timeline

- Game Logic
 - Friday, November 17
 - Finish a basic version of the Mario and Barrel logic
 - Wednesday, November 22
 - Have a completed basic version of all of the main logic modules
- Display Logic
 - Friday, November 17
 - All objects loaded onto ZBT RAM
 - Begin Assembling of Frame Buffer
 - Wednesday, November 22
 - Frame buffer with all 5 objects displayed onto the monitor