

CMPM 120

Optimization & Debugging

But first, your Endless Runner

Organization (2.5 points)

Comments	Logically comment your source to demonstrate that you understand how each section works. (0.5)
Organization	Your file structure is organized logically and legibly (0.5)
No Errors	Game runs from localhost (0.5) with no code errors (0.5).
Submit	Submit your project to Canvas as a .zip that includes the framework so the graders can run it. (0.5)

<https://canvas.ucsc.edu/courses/26569/assignments/86776>

Structure and Design I

3 States	Have at least three states: a main menu (0.5), a state where you play the actual game (0.5), and a game over state (0.5). You may name these however you like. You may also have more, depending on how you structure your game.	Collision Detection	Properly use collision detection (0.5).
Instructions	Communicate how to play w/ clear instructions (0.5).	Background Music	Have looping background music (0.5).
State Transitions	Properly transition between states and allow the player to restart w/out having to reload the page (0.5).	Sound Effects	Use sound effects for key mechanics and/or events (0.5) according to your design.
Player Input	Have some form of player input/control (0.5) according to your design.	Randomness	Use randomness to generate challenge, e.g. terrain, pickups, etc. (0.5).

Structure and Design II

Animated Character	Include an animated character(s) (0.5) that use a texture atlas (0.5).	Metric	Include some metric of accomplishment that a player can improve over time, e.g., score (0.5).
Simulate Scrolling	Simulate scrolling, e.g., tilesprite (0.5).	Endless	Be theoretically endless (0.5).
Playable	Be playable for at least 15 seconds for a new player of low to moderate skill (0.5). (DO THE OPPOSITE OF THIS VIDEO: https://www.youtube.com/watch?v=eb60pnjABGg)		



Creative Tilt (2 points)

Does your game...

Technical Interest	...do something technically interesting? Are you particularly proud of a programming technique you implemented? Did you look beyond the class examples and learn how to do something new? (1)
Visual Style	...have a great visual style? Does it use music or art that you created? Are you trying something new or clever with the endless runner form? (1)

Game Development Crimes

<https://twitter.com/fullbright/status/1073624811107016704>



Rami Ismail ✓

@tha_rami

Following



Dear gamers: all games are duct-taped together by the hopes and dreams of developers.

Dear developers: all games are built as shitty as yours is, especially considering that one thing you did that time when you just couldn't figure it out but hey it works and you'll fix it never

Steve Gaynor ✓ @fullbright

please share your most embarrassing game dev crimes. Mine: all the scripting in Gone Home is contained in 2 gigantic uScript graphs, bc I didn't know about interlinking many smaller graphs at the time. It's only 2 bc the first one started running too slow to navigate. Your turn.

Show this thread

3:27 AM - 16 Dec 2018

Definitely don't do these



Jake Rodkin @ja2ke · 15 Dec 2018

Replying to @fullbright

the final scene for the final TTG Sam & Max game can never be changed, because I baked the lights in Maya, exported the lightmaps to the game engine, checked it in, then slammed every program on my PC shut because we were supposed to be locked hours ago. never saved the Maya file



7



78



1.4K



Pat Scott @_Stralor · 14 Dec 2018

Replying to @fullbright

There is only one file in the first game I ever coded: a single class encapsulating everything.

UI draw calls, game logic, text parsing, etc. 1000s of lines.

Bonus: I had no idea what "static" meant, nor how to pass non-static objects. So I made everything static. Everything.



13



35



643





Matthew Brooks @brooksoid · 15 Dec 2018

Replying to @fullbright

Every game entity in Wolverine's Revenge contains a single bit determining whether it's a helicopter taking off or not. Including Wolverine.



15



361



1.9K



WONTFIX



Glen Watts @MrFlabyo · 15 Dec 2018

Replying to @fullbright

The dog in fable 2 can't turn on the spot (lacked the animations for it), so sometimes the AI get stuck running in a small circle trying to get to a goal it can't ever reach. We gave up trying to fix it because 'dogs do that'. No one in QA ever filed a bug for it.



Some sims need warm-up time



Lee Perry Yo! @MrLeePerry · 16 Dec 2018

Replying to @fullbright

Omg so many.

I had some garbage "blowing around" in a C meshes attached to tiny invisible squadmate

I don't know if I ever told anyone that, haha

7 40 421



Brendan Walker @binarys · 15 Dec 2018

Replying to @fullbright

Not mine, but one I secretly loved. On "Pirate designer needed a fire ship. Ships didn't sup have NPC stations. NPCs did support emitters set them on fire D:.

3 128 1.4K



Steven Lumpkin @Silent0sirir · 16 Dec 2018

Replying to @fullbright

Everything cool in The Secret World's boss crash test dummy at a spot, giving it the sa cast a spell.

(This is very normal, but it sure sounds weird)

1 9 102



Robin-Yann Storm @RYStorm · 16 Dec 2018

For World of Warcraft entities this used to be bunnies. Just invisible bunnies all over the p For all kinds of purposes.

3 10 81



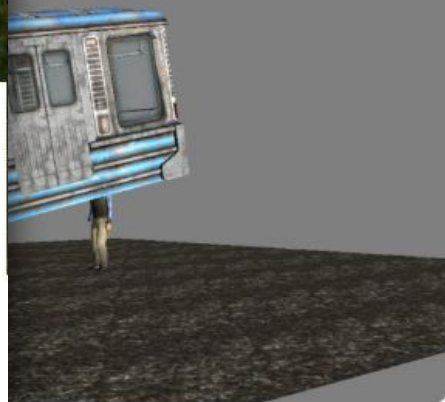
Jessica Harvey @oysterFAKE · 15 Dec 2018

Replying to @fullbright



When you rode a horse, we simply put the horse inside the player, and spawned a pair of pants that looked like your horse, which you then equipped and wore.

When we first did this, however, we forgot to make the horse stop acting like a horse. Pretty soon there was a rash of server crashes because the horse inside the player was wandering around, picking up the stuff it found inside the player, rifling through the player's backpack and eating things it thought were edible, and eventually, wandering "off the map" because the player's internal coordinate system was pretty small, and the edges weren't impassable.



5 202 2.0K

Don't (deliberately) do crimes

But games aren't realistic simulations and sometimes you just hack in a solution and go work on other things instead

Game Physics are not real physics

<https://twitter.com/AlandGames/status/1149999152551604224>

Optimization:

Finding ways for
the computer to
do less work

Frames

One second



Thirty frames per second:

~33.33 milliseconds per frame

Sixty frames per second:

~16.67 milliseconds per frame

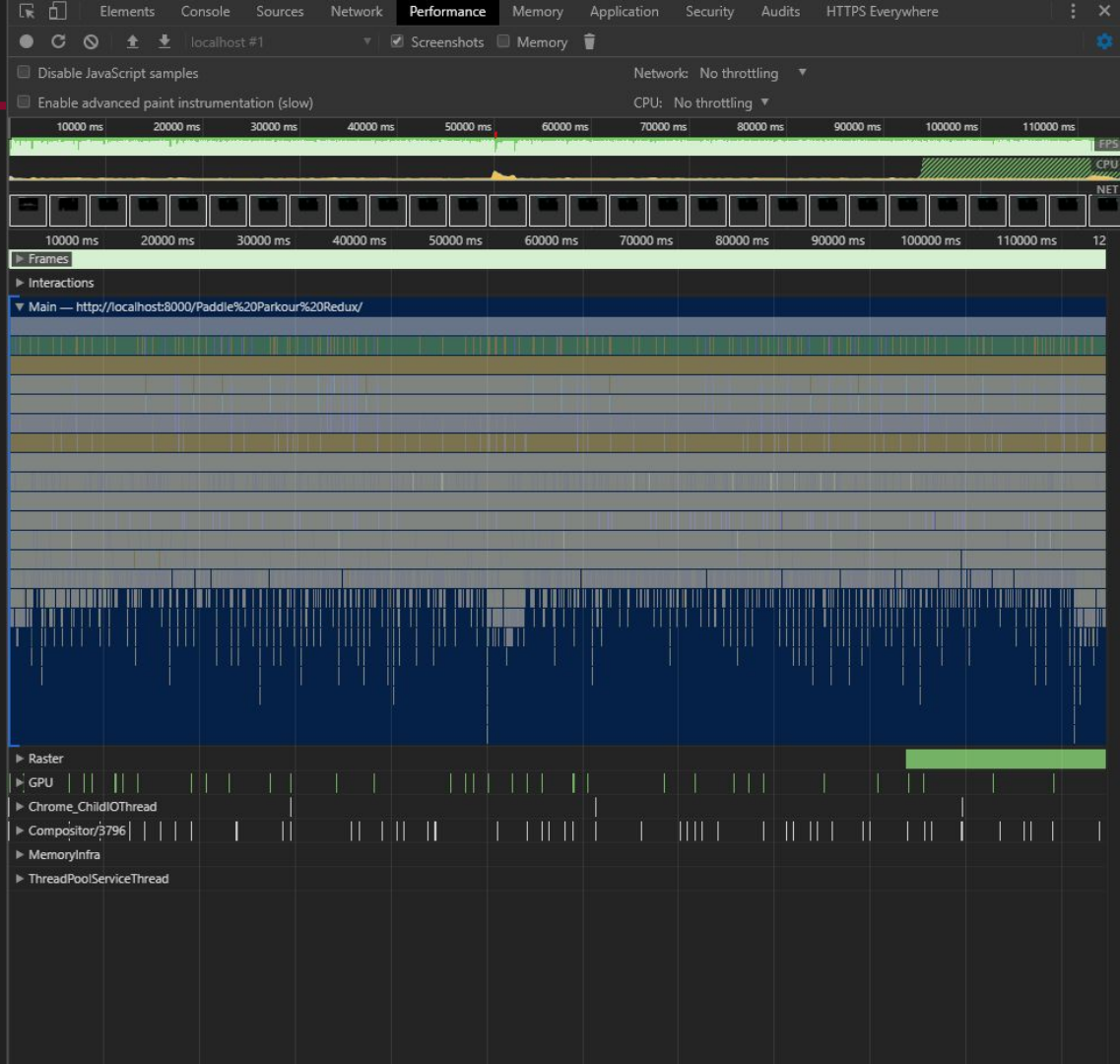
Frame Budget

One frame



Profiling

Luckily for us, browsers have built-in profiling tools

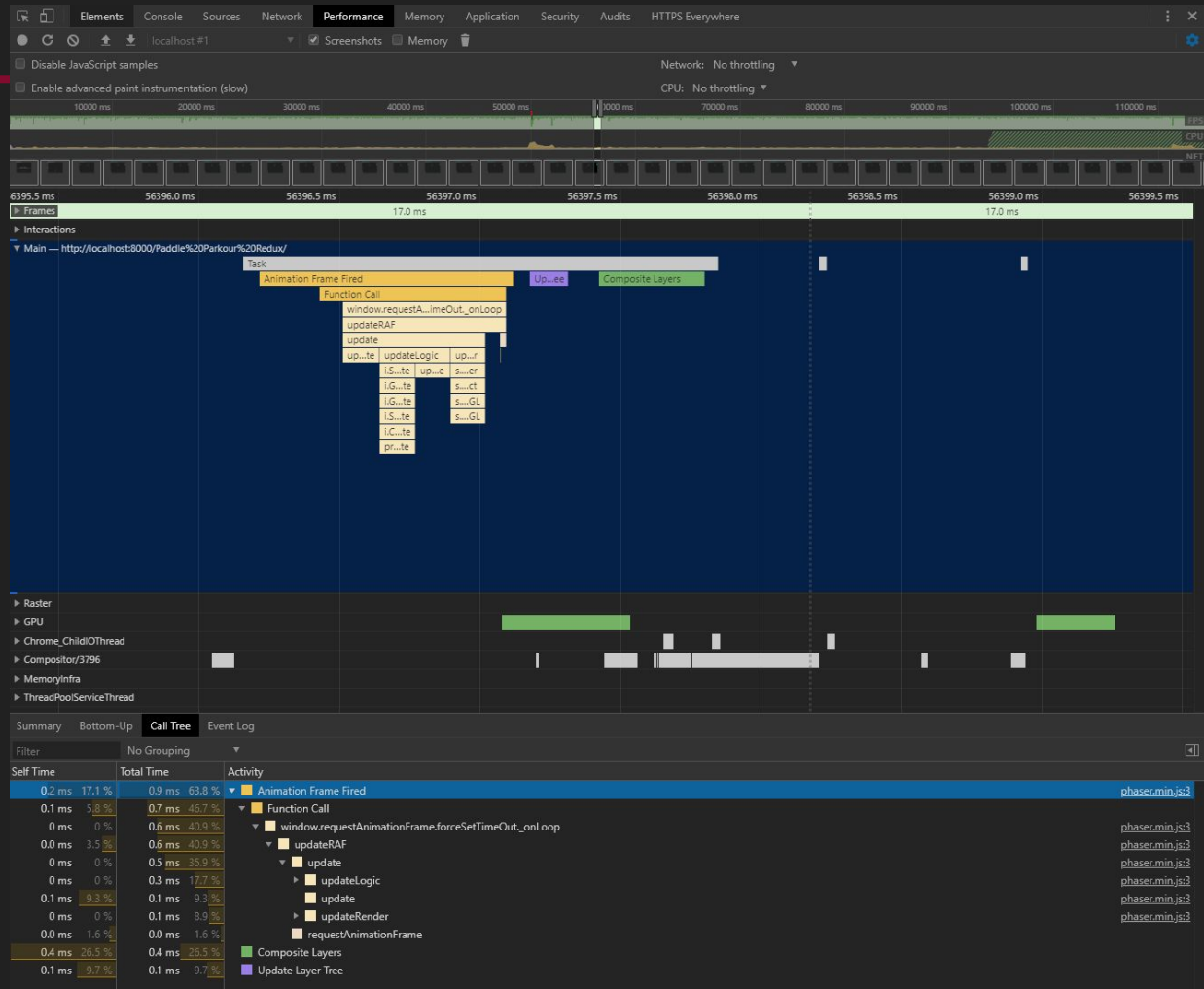


Profiling

We can drill down and see how many microseconds each operation is taking.

ms = millisecond =
1/1000th

µs = microsecond =
1/1,000,000th



“*We should* forget about small efficiencies, say about 97% of the time: **premature optimization** is the root of all evil. Yet we should not pass up our opportunities in that **critical 3%**”

"Structured Programming with go to Statements," **Donald Knuth**, p. 268

How to do less work

But first check to see if what you are doing even matters

Make the calculations cheaper

Make the inner loop faster

Do fewer calculations

Don't run everything every frame

Debugging

Useful random debugging advice

1. When you find a problem, change something so that same problem can't happen again
 - a. `assert()`
 - b. Keep a debugging notebook
2. Make debug tools
 - a. Quicker feedback is better
 - b. Display values live if possible
3. Only make one change at a time and then test it
4. Just because you paused the game doesn't mean it's paused
 - a. And stopping one update doesn't mean you stopped all of them
5. `console.log()` is slow
 - a. Faster to print an array as a string than to individually print the contents

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AABB characters and slopes

An example of a real-world
physics-and-debugging problem in a game
with 2D physics like yours

<https://twitter.com/eevee/status/1133248372624613376>