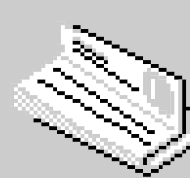
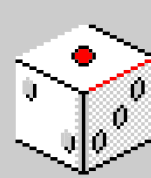
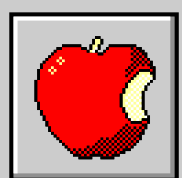


WHY ARE PEOPLE DEVELOPING INSIDE CONTAINERS?



How GitHub Codespaces
takes containerization
to the next level

by Rizel Scarlett



11:11PM

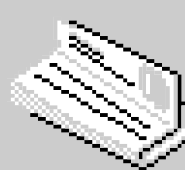
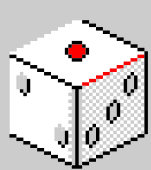
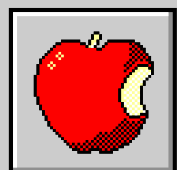
System Error



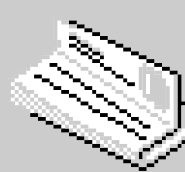
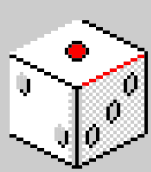
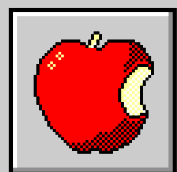
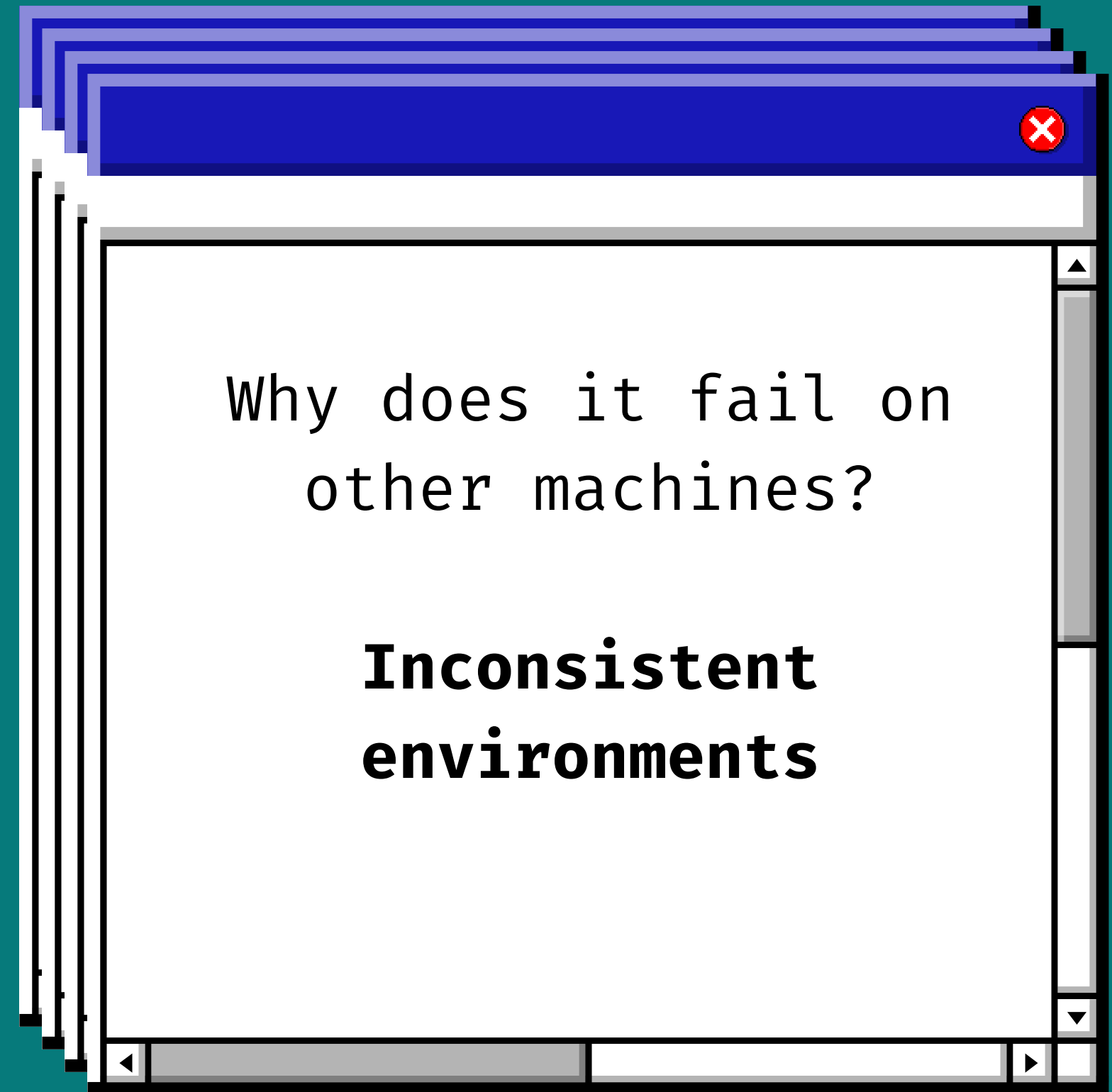
A fatal exception 0E76534801 has occurred at 0027:C87123 in VXD VMM.
Operating system has been stopped to prevent damage to your computer.

- * First off, what are containers?????????
- * Why are people developing inside containers??????

Press any key to continue _



"It works on my machine" - every engineer every



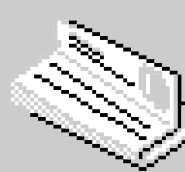
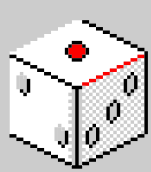
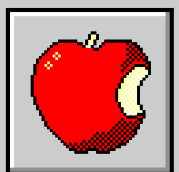


(Enter Containers)

What is a container?



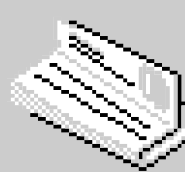
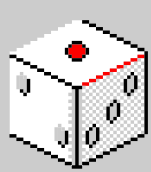
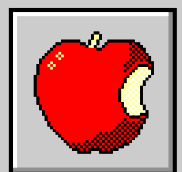
"A container is a standard unit of software that packages up code and all its dependencies so the application runs quickly and reliably from one computing environment to another." - Docker



Docker



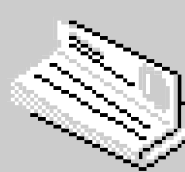
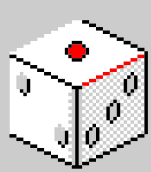
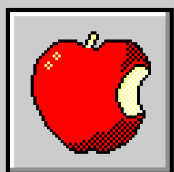
- Founded March 2013
- Open Source platform
- Containers already existed, but this popularized the use



Breaking it down



- Containers enable software engineers to program in a consistent environment.
- Dev mirrors production with same operating system, configurations, and dependencies.
- This ensures bugs and features behave the same across all environments



A red brick wall with a white speech bubble containing the text "LET'S GO BACK IN TIME...". The wall is made of red bricks with white mortar. The speech bubble is white with a black border and contains the text in a bold, black, sans-serif font. The text is arranged in two lines: "LET'S GO BACK IN" on the top line and "TIME..." on the bottom line. The background is a solid yellow color.

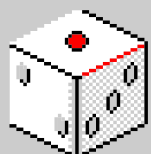
**LET'S GO BACK IN
TIME...**

1979



Chroot

- Changing the root directory for a given process
- Provides an isolated environment for build processes and dependencies



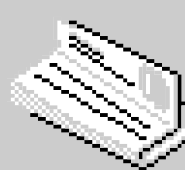
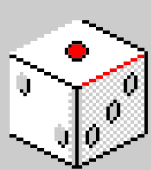
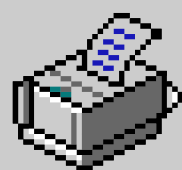
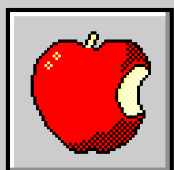
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2000



FreeBSD Jails

- Allows developers to isolate and test updates or changes without jeopardizing the integrity of the rest of the system.
- Designated IP address

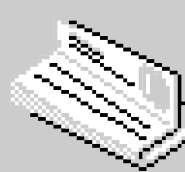
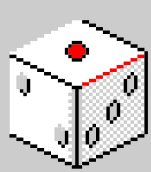


2006



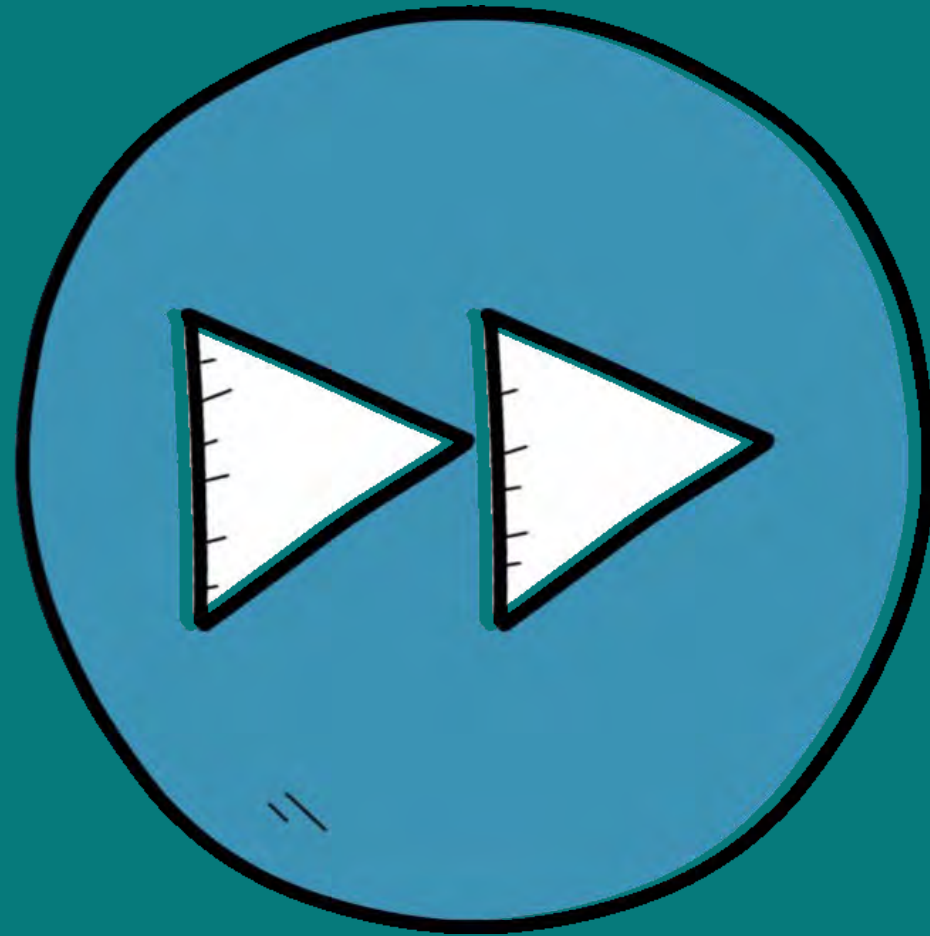
Process Containers aka Control Groups aka cgroups

- Limiting, accounting and isolating resource usage (CPU, memory, disk I/O, network)



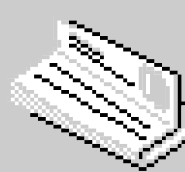
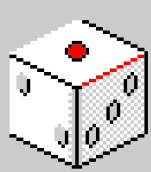
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Fast forward



Docker

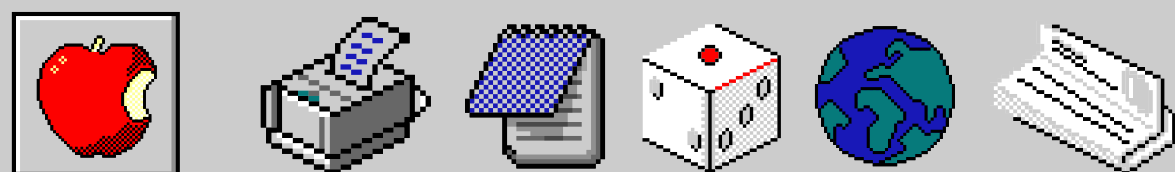
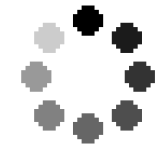
- Ease of use
- Introduced a suite of management and packaging tools for containerization





The pursuit

Running software reliably
from one environment to
another





**Codespaces takes
containerization to
the next level**



Hi, I'm Rizel
Scarlett!



- Junior Developer Advocate at GitHub
- Software Engineer for ~3 years
- Advisor and Director of G{Code}
- Addicted to social media



@blackgirlbytes



- Twitter
- Instagram
- Dev.to and Hashnode
- Twitch:
blackgirlbytes1



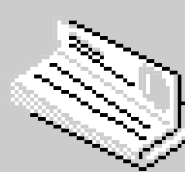
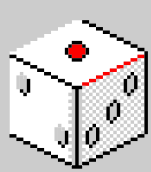
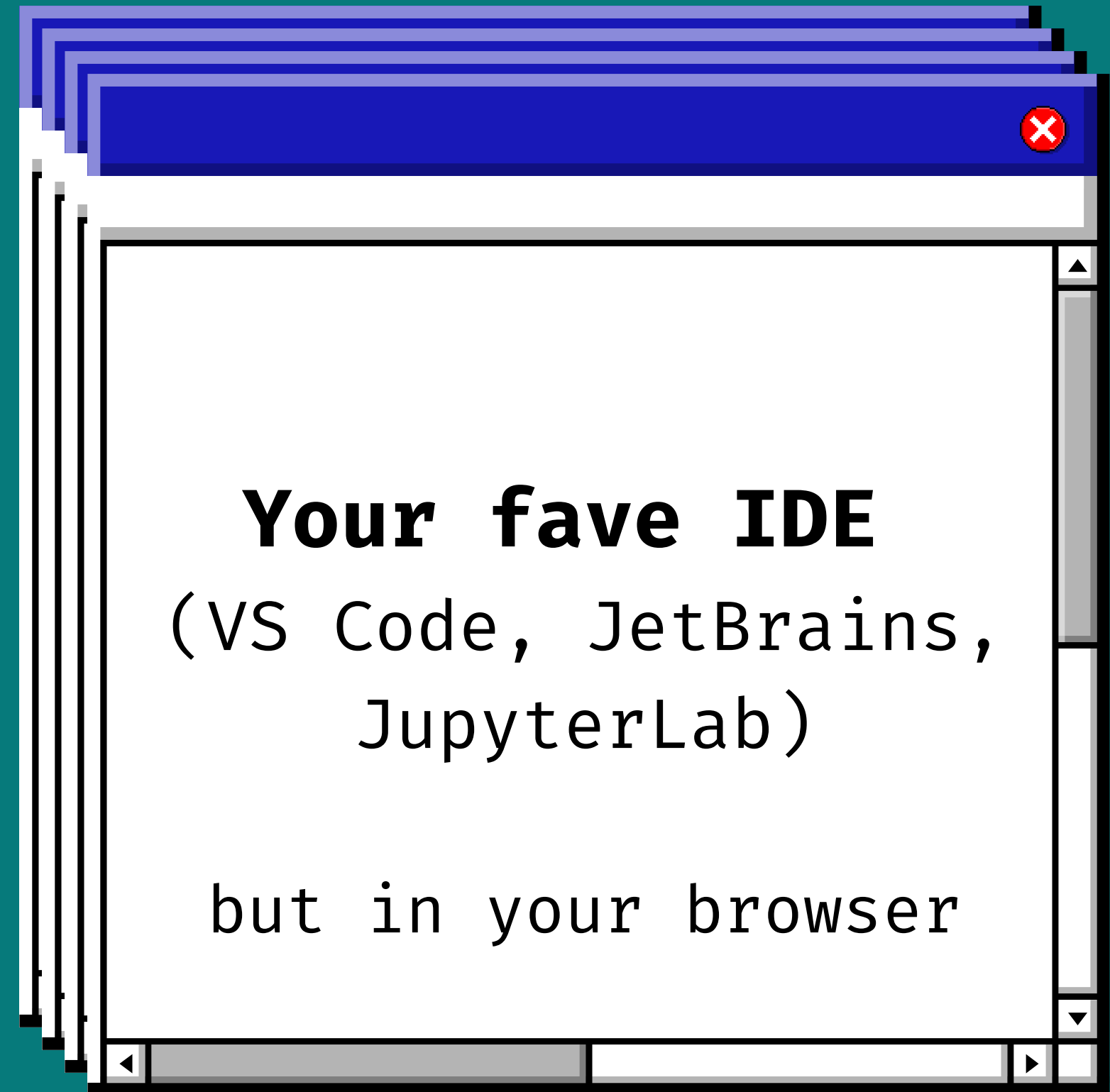
Agenda



- What is GitHub Codespaces?
- How it takes development to the next level



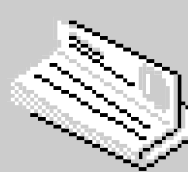
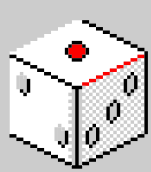
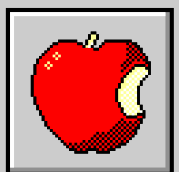
GitHub Codespaces



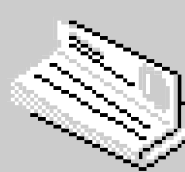
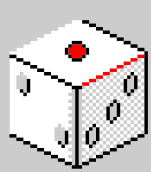
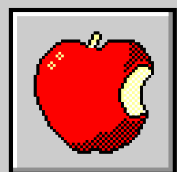
GitHub Codespaces



When you work in a codespace, the environment you are working in is created using a development container hosted on a virtual machine.



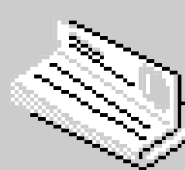
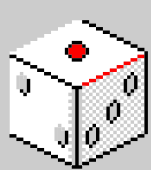
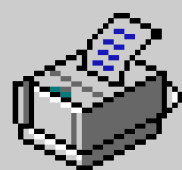
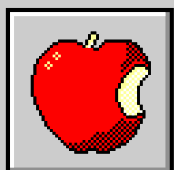
GitHub Codespaces



THE CLOUD



the cloud ===
an environment that
doesn't reside on your
computer but rather on the
internet.



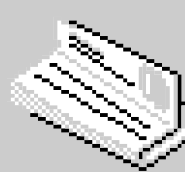
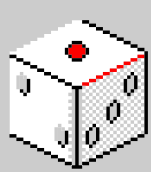
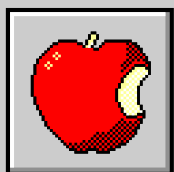
Codespaces is NOT the GitHub Web Editor



Codespaces and the web-based editor

Both the web-based editor and GitHub Codespaces allow you to edit your code straight from your repository. However, both have slightly different benefits, depending on your use case.

	web-based editor	Codespaces
Cost	Free.	Costs for compute and storage. For information on pricing, see " Codespaces pricing ."
Availability	Available to everyone on GitHub.com.	Available for organizations using GitHub Team or GitHub Enterprise Cloud.
Start up	The web-based editor opens instantly with a key-press and you can start using it right away, without having to wait for additional configuration or installation.	When you create or resume a codespace, the codespace is assigned a VM and the container is configured based on the contents of a <code>devcontainer.json</code> file. This set up may take a few minutes to create the environment. For more information, see " Creating a Codespace ."
Compute	There is no associated compute, so you won't be able to build and run your code or use the integrated terminal.	With Codespaces, you get the power of dedicated VM on which you can run and debug your application.
Terminal access	None.	Codespaces provides a common set of tools by default, meaning that you can use the Terminal exactly as you would in your local environment.
Extensions	Only a subset of extensions that can run in the web will appear in the Extensions View and can be installed. For more information, see " Using extensions ."	With Codespaces, you can use most extensions from the Visual Studio Code Marketplace.



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Benefits of GitHub Codespaces



Faster onboarding

Automate the onboarding process with configuration as code



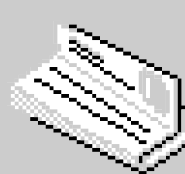
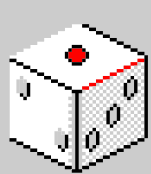
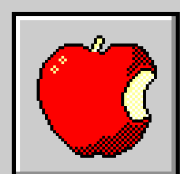
Code from anywhere

Browser based IDE means you can code from anywhere with internet



It works on both machines

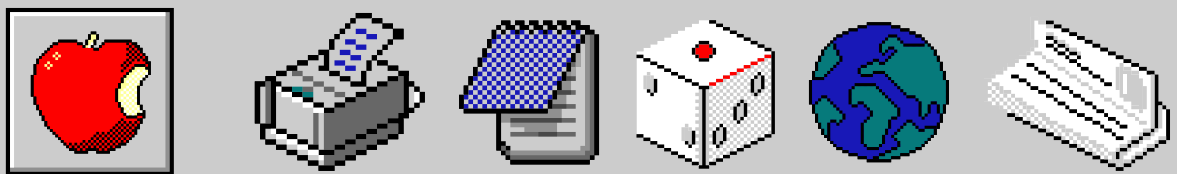
use of containers brings uniformity to developer environments



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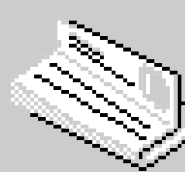
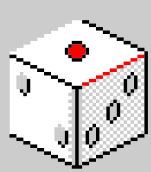
For onboarding new employees



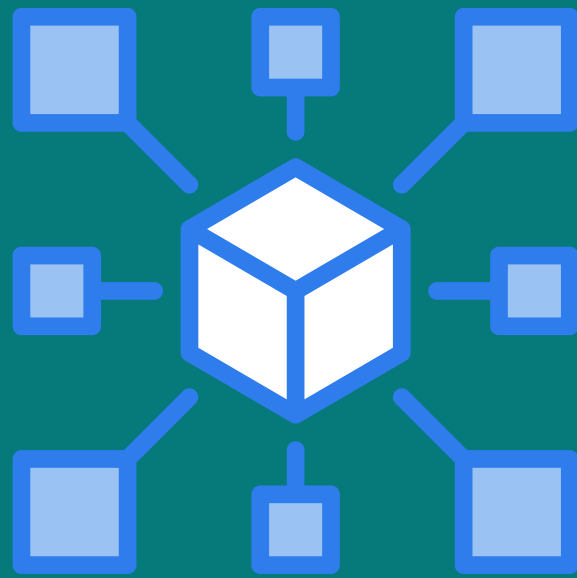
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Configuration as Code

- Config files dictate how your app should run on an environment (platform, hardware, etc)
- Managing your config files in a repository with version control
- Using version control
=Centralized location, CI/CD, tracing bugs

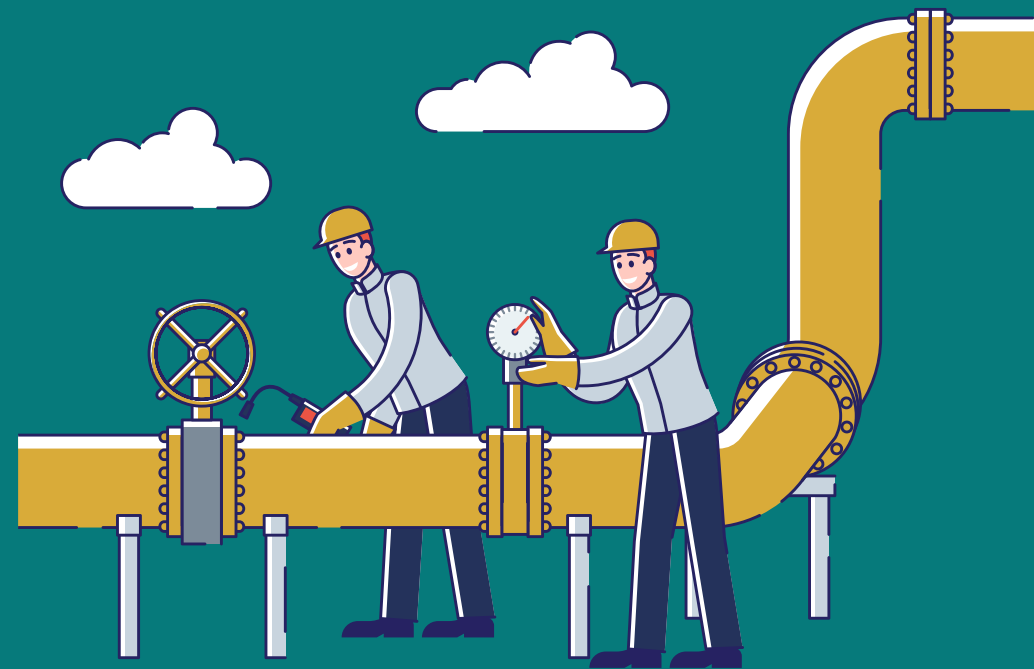


Benefits of Config as Code



Centralization

One single source of truth



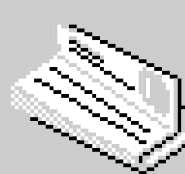
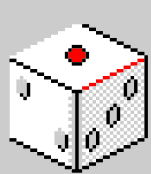
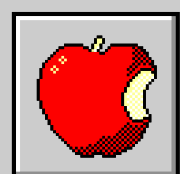
CI/CD

Enables linting, testing, and security scanning on your config files while you run those tests on your code.



Traceability

If bugs happen, you can look through source control to identify what changed

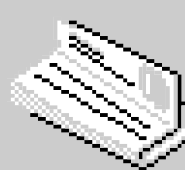
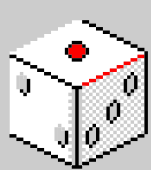
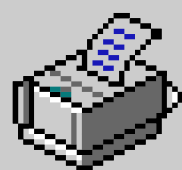
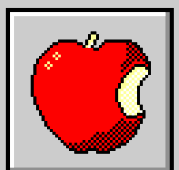


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devcontainer.json

```
{
  "name": "Node.js",
  "build": {
    "dockerfile": "Dockerfile",
    // Update 'VARIANT' to pick a Node version: 18, 16, 14.
    // Append -bullseye or -buster to pin to an OS version.
    // Use -bullseye variants on local arm64/Apple Silicon.
    "args": { "VARIANT": "16-bullseye" }
  },
  // Configure tool-specific properties.
  "customizations": {
    // Configure properties specific to VS Code.
    "vscode": {
      // Add the IDs of extensions you want installed when the container is created.
      "extensions": [
        "dbaeumer.vscode-eslint", // this is the extension id for eslint
        "esbenp.prettier-vscode", // this is the extension id for prettier
        "ms-vscode.vsliveshare", // this is the extension id for live share
      ]
    }
  },
  // Use 'forwardPorts' to make a list of ports inside the container available locally.
  // "forwardPorts": [],
  // Use 'postCreateCommand' to run commands after the container is created.
  // "postCreateCommand": "yarn install",
  // Comment out to connect as root instead. More info: https://aka.ms/vscode-remote/containers/non-root.
  "remoteUser": "node"
}
```

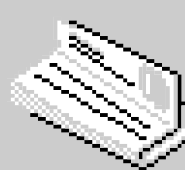
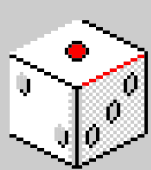
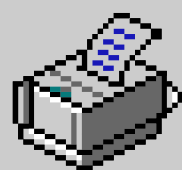
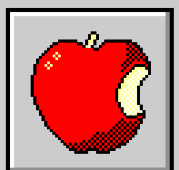
- You can configure a codespace to automatically install
 - extension
 - env variables
 - Install commands
 - Build commands
 - Dockerfile
 - Port forwarding
 - Post-creation commands



Dockerfile

```
FROM node:16-bullseye
```

- Dockerfiles are used to automate the installation and configuration of a container.
- Contains a list of commands that the Docker client calls while creating an image.



docker-compose.yml

```
version: '3.8'

services:
  app:
    build:
      context: ..
      dockerfile: .devcontainer/Dockerfile
    args:
      VARIANT: "3"
      NODE_VERSION: "none"

    volumes:
      - ../workspace:cached

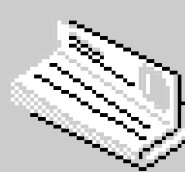
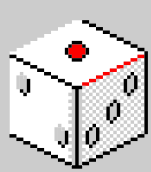
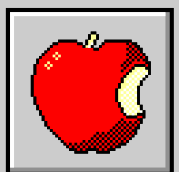
    command: sleep infinity

    network_mode: service:db

  db:
    image: postgres:latest
    restart: unless-stopped
    volumes:
      - postgres-data:/var/lib/postgresql/data
    hostname: postgres
    environment:
      POSTGRES_DB: my_media
      POSTGRES_USER: example
      POSTGRES_PASSWORD: pass
      POSTGRES_HOST_AUTH_METHOD: trust
    ports:
      - 5432:5432

volumes:
  postgres-data: null
```

- Useful if you want to run multiple containers
 - run a database and a web server in a Codespace
 - you can use the docker-compose.yml file to run both containers

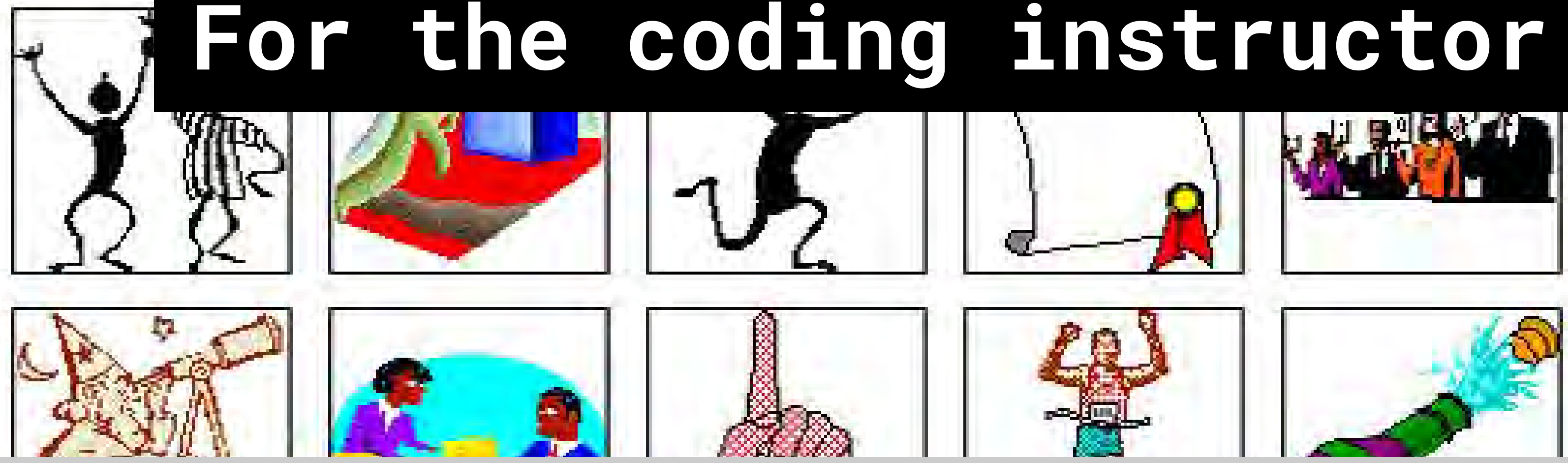


Search for clips: Type one or more words...

Pictures Sounds Motion Clips

Clips 10 - 49 in Special Occasions

For the coding instructor



OPEN EDITORS

GROUP 1

- CodeSwing
- index.html

GROUP 2

- index.html

GROUP 3

- style.css

GROUP 4

- script.js

CLOCK-CODESPACE-WO...

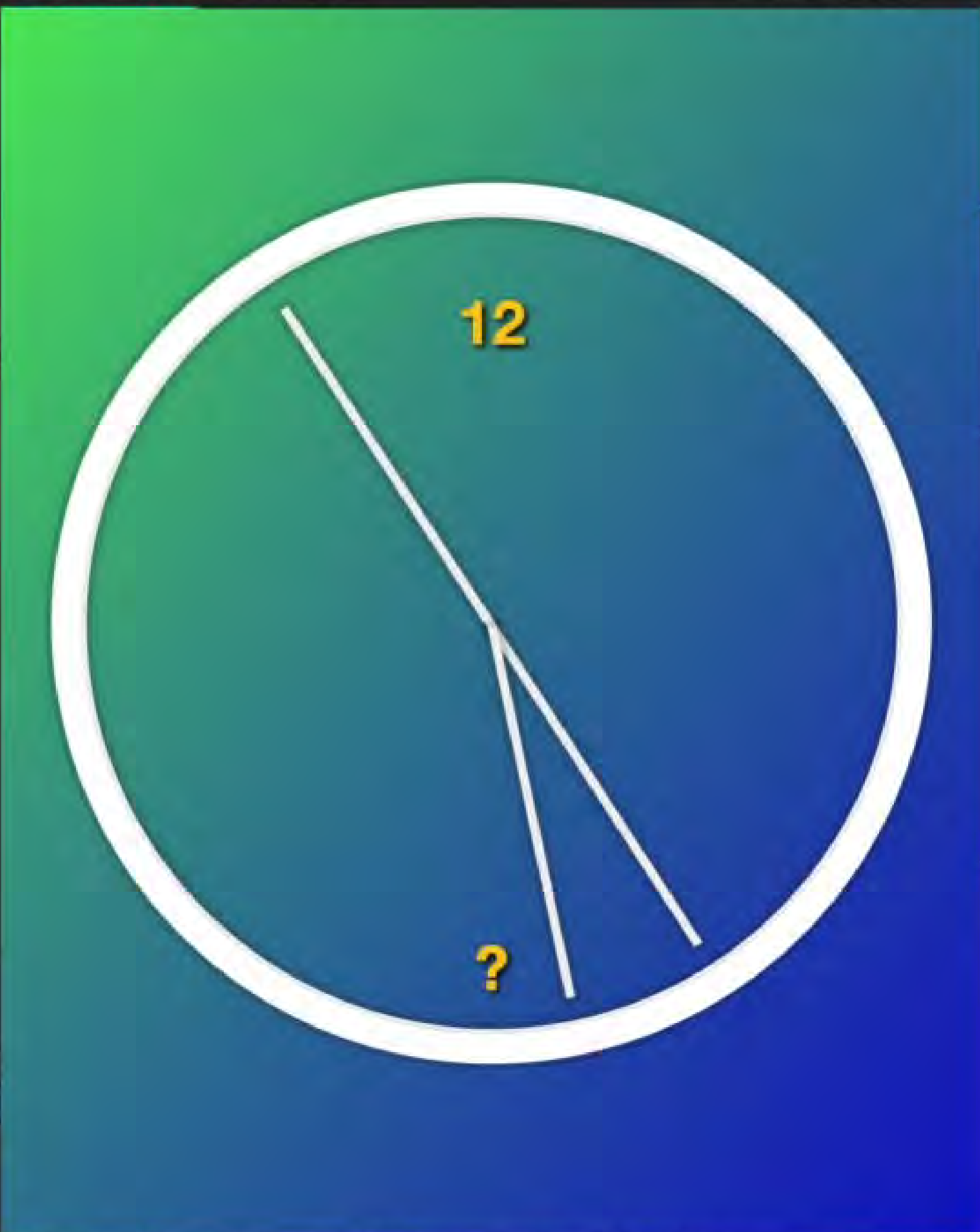
- .devcontainer
- .vscode
- codeswing.json
- index.html
- LICENSE
- main.tour
- README.md
- script.js
- style.css

OUTLINE

TIMELINE

CODET...

- Fix The Broken...
- #1 - index.... ↓
- #2 - in... ↑ ↓
- #3 - style.css
- #4 - script.js



```

index.html > html > body > div.clock
17 <div class="hour min-hand" ></div>
18 <div class="hand second-hand" ></div>
19 </div>
20 <!-- update the question mark to the number 6 -->
21 <h1 id="six">?</h1>
22 </div>

```

Start discussion

CodeTour Step #2 of 5 (Fix The Broken Clock)

Our clock has a question mark instead of the number 6. Update the `<h1 id='six'>?</h1>` to render the number 6!

```

# style.css > html
1 html {
2   background-size:cover;
3   font-family:'helvetica neue';
4   text-align:center;
5   font-size:18px;
6 }
7 h1{
8   color:#FFC312;
9   text-shadow: 2px 2px 4px #000000;
10 }
11 body {
12

```

```

JS script.js > ...
1 const secondHand = document.querySelector('.second-hand');
2 const minsHand = document.querySelector('.min-hand');
3 const hourHand = document.querySelector('.hour-hand');
4 function setDate() {
5   const now = new Date();
6   const seconds = now.getSeconds();
7   const secondsDegrees = ((seconds / 60) * 360) + 90;
8   secondHand.style.transform = `rotate(${secondsDegrees}deg)`;
9   const mins = now.getMinutes();
10  const minsDegrees = ((mins / 60) * 360) + ((seconds/60)*6) + 90;
11  minsHand.style.transform = `rotate(${minsDegrees}deg)`;
12  const hour = now.getHours();

```

12

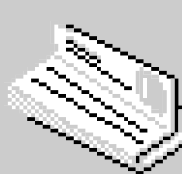
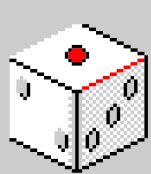
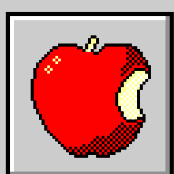
6

6

I set up a devcontainer.json

```
{} devcontainer.json M X
.devcontainer > {} devcontainer.json > [ ] extensions
1  {
2    "extensions": [
3      "dbaeumer.vscode-eslint",
4      "esbenp.prettier-vscode",
5      "ms-vsliveshare.vsliveshare",
6      "blackgirlbytes.deploy-to-github-pages",
7      "tinkertrain.theme-panda",
8      "codespaces-contrib.codeswing",
9      "vsls-contrib.codetour",
10     "streetsidesoftware.code-spell-checker"
11   ]
12 }
13
```

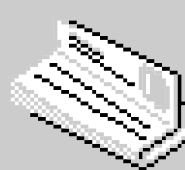
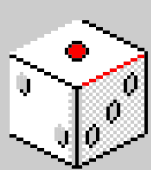
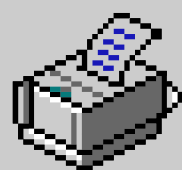
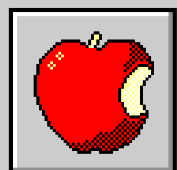
**Installed
necessary
extensions**



CodeSwing

```
{ } codeswing.json M X
{ } codeswing.json > ...
1   {
2     "scripts": [],
3     "styles": [],
4     "layout": "splitRight"
5   }
```

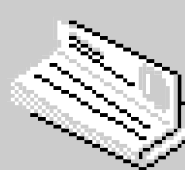
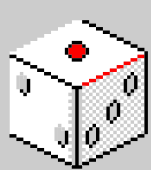
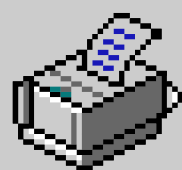
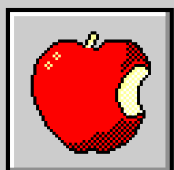
**An interactive
coding playground
that splits code
files and browser
preview**



CodeTour

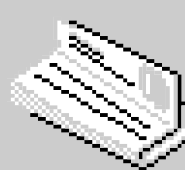
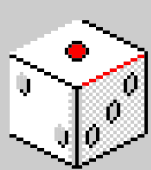
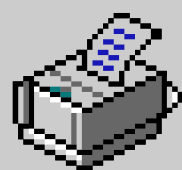
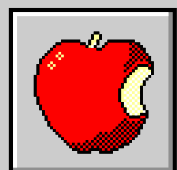
```
main.tour M x
main.tour
1 {
2   "$schema": "https://aka.ms/codetour-schema",
3   "title": "Fix The Broken Clock",
4   "steps": [
5     {
6       "file": "index.html",
7       "line": 2,
8       "description": "Hey! 🎉 Welcome to the Fix The Broken Clock workshop. Something is very wrong with this clock, and we need your help to fix it. Use this tour to guide you through the app, and learn how to interact with its live coding environment. Try changing their text content and watch it take effect immediately!\n\nClick the 'Next' link below to keep learning 🎉"
9     },
10    {
11     "file": "index.html",
12     "line": 22,
13     "description": "Our clock has a question mark instead of the number 6. Update the '<h1 id='six'>?</h1>' to render the number 6!"
14    },
15    {
16     "file": "style.css",
17     "line": 13,
18     "description": "Great job at fixing the numbers over the clock. Check out background colors for the clock. Hover over the '<hex>' color to choose the background color of your choice."
19    },
20    {
21     "file": "script.js",
22     "line": 14,
23     "description": "The hour hand is moving just as fast as the second hand. Let's fix this by changing the word 'seconds' on line 14 to 'hours'."
24    },
25    {
26     "file": "script.js",
27     "line": 18,
28     "description": "Mission complete! Thank you for completing this workshop."
29    }
30  ]
31 }
```

**An extension that
gives you a tour
of the codebase**



[Back to Agenda Page](#)

For the programmer who likes experimenting



[Back to Agenda Page](#)

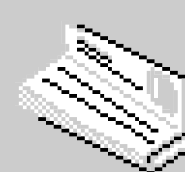
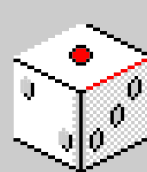
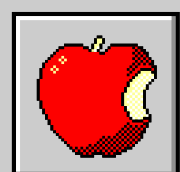


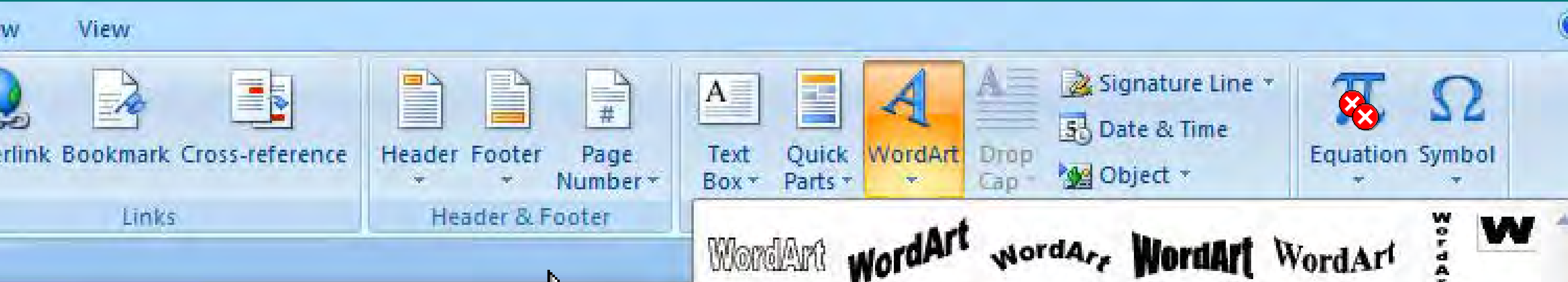
Templates



Try new frameworks
or skip the installation process with

<https://github.com/codespaces/templates>





For the pair programmer

Word 2007 WordArt
DropDown



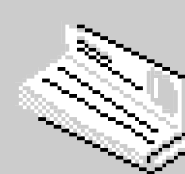
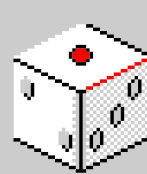
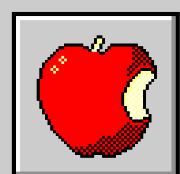
[Back to Agenda Page](#)



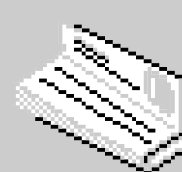
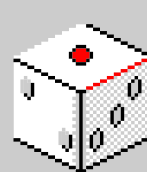
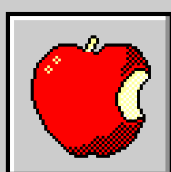
Enable port forwarding



Prove to your teammate that it DOES
work on your machine



**Did you know you
could manage
codespaces from
the command
line?**



[Back to Agenda Page](#)

Owned by blackgirlbytes

blackgirlbytes/codespaces-forward-port
automatic doodle 4-core • 1.27 GB • Last used 2 days ago
main* Uncommitted changes

blackgirlbytes/oauth-github-nextjs
potential acorn 4-core • 2.98 GB • Last used 4 days ago
main* Uncommitted changes

blackgirlbytes/add-to-maintainer-group
fuzzy adventure 2-core • 1.89 GB • Last used 11 days ago
main* Uncommitted changes

Created from primer/react-template
didactic capybara 2-core • Retrieving... • Last used 18 days ago

blackgirlbytes/InviteCollaboratorAction
glowing space palm-tree 2-core • Retrieving... • Expiring in 2 days
main* Uncommitted changes

Owned by galaxy-bytes


```
zsh — zsh (figterm) — zsh
rize1@Rizels-MacBook-Pro-2 ~ % gh codespace create
-r galaxy-bytes/pinkmoon
```

galaxy-bytes Codespaces Using GitHub Codespaces with

github.com/codespaces

blackgirlbytes/add-to-maintainer-group
fuzzy adventure 2-core • Last used 11 days ago
 main* Uncommitted changes

Created from primer/react-template
didactic capybara 2-core • Last used 18 days ago

blackgirlbytes/InviteCollaboratorAction
glowing space palm-tree 2-core • Expiring in 2 days
 main* Uncommitted changes

Owned by galaxy-bytes

galaxy-bytes/stable-diffusion
cuddly space pancake 6-core (1 GPU) • Last used about 20 hours ago
 main* Uncommitted changes

Owned by github

Created from github/codespaces-jupyter
opulent train 4-core • Last used about 20 hours ago

```
zsh — zsh (figterm) · zsh
rizel@Rizels-MacBook-Pro-2 ~ % gh codespace create
-r galaxy-bytes/pinkmoon -b main
  ↳ Codespaces usage for this repository is paid for by galaxy-bytes
? Choose Machine Type: 2 cores, 4 GB RAM, 32 GB storage
blackgirlbytes-upgraded-potato-5vjp466p4rcpgwv
rizel@Rizels-MacBook-Pro-2 ~ % █
```

- blackgirlbytes/add-to-maintainer-group
fuzzy adventure 2-core • Last used 11 days ago
 - main * Uncommitted changes
- Created from primer/react-template
didactic capybara 2-core • Last used 18 days ago
- blackgirlbytes/InviteCollaboratorAction
glowing space palm-tree 2-core • Expiring in 2 days
 - main * Uncommitted changes

Owned by galaxy-bytes

- galaxy-bytes/pinkmoon
upgraded potato 2-core • Active
 - main No changes
- galaxy-bytes/stable-diffusion
cuddly space pancake 6-core (1 GPU) • Last used about 20 hours ago
 - main * Uncommitted changes

```
zsh — zsh (figterm) — zsh
rize1@Rizels-MacBook-Pro-2 ~ % gh codespace delete
-c CODESPACE-NAME
```

galaxy-bytes Codespaces Using GitHub Codespaces with

blackgirlbytes-upgraded-potato-5vjp466p4rcpgwv

GitHub Content Hacks GitHub Open Source Intro GCode Call for Presentat... Schedule Appoint...

blackgirlbytes/add-to-maintainer-group
fuzzy adventure 2-core • Last used 11 days ago
main • Uncommitted changes

Created from primer/react-template
didactic capybara 2-core • Last used 18 days ago

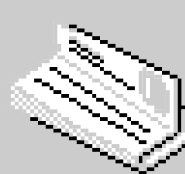
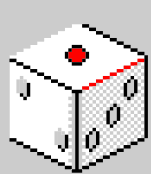
blackgirlbytes/InviteCollaboratorAction
glowing space palm-tree 2-core • Expiring in 2 days
main • Uncommitted changes

Owned by galaxy-bytes

galaxy-bytes/pinkmoon
memorable-name 2-core • Active
main • No changes

galaxy-bytes/stable-diffusion
cuddly space pancake 6-core (1 GPU) • Last used about 20 hours ago
main • Uncommitted changes

For the AI practitioner



[Back to Agenda Page](#)



Update prompt and run the cell to create art!

```

from torch import autocast

# Change prompt for image here!
prompt = "a cartoon black girl with cotton candy hair and a pink dress standing in front of a pink sky with cotton candy clouds"
with autocast(device):
    image = pipe(prompt, height=768, width=768).images[0]
image

```

✓ 13.4s

100% | 50/50 [00:11<00:00, 4.39it/s]

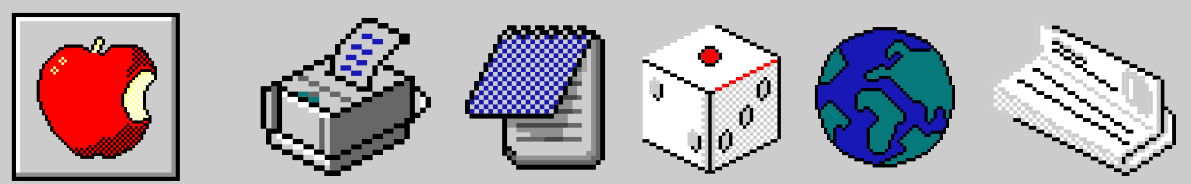
```

(variable) prompt: Literal['a polar bear looking at the northern lights']
prompt
prompt = "a polar bear looking at the northern lights"
with autocast(device):
    image = pipe(prompt, height=768, width=768).images[0]
image

```

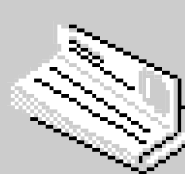
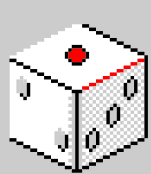
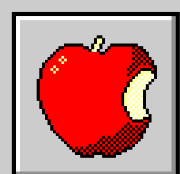
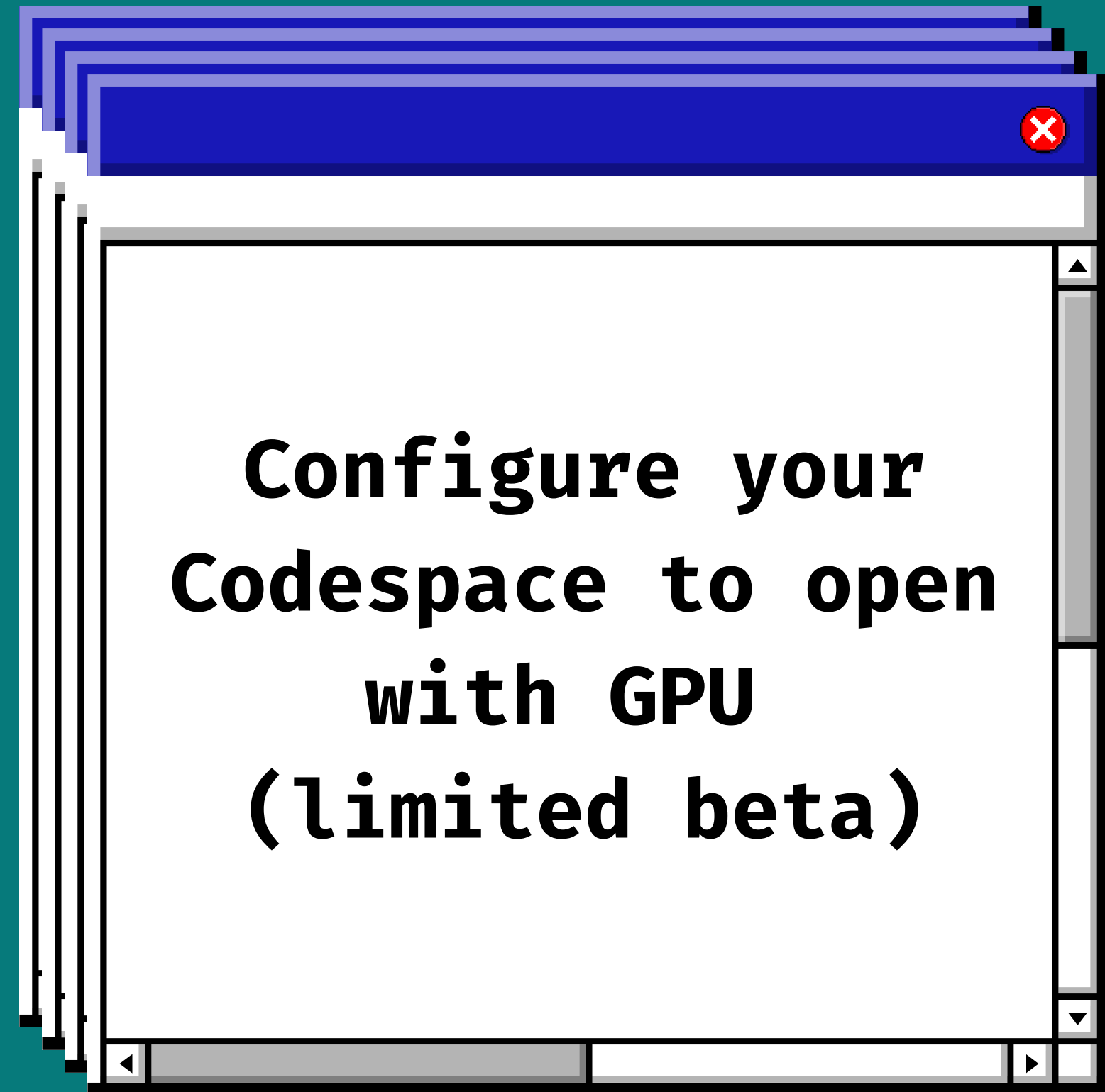
✓ 12.0s

100% | 50/50 [00:11<00:00, 4.38it/s]



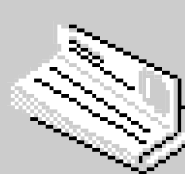
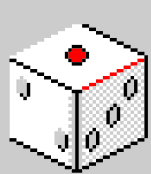
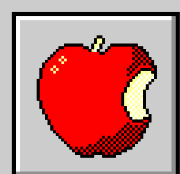
[Back to Agenda Page](#)

GPU-powered



[Back to Agenda Page](#)

Hugging Face



[Back to Agenda Page](#)

EXPLORER

OPEN EDITORS

- [Preview] README.md
- Quokka: What's New
- stable-diffusion-v2.ipynb notebooks
- STABLE-DIFFUSION [CODESP...]
- .devcontainer
- .vscode
- notebooks
 - stable-diffusion-v2.ipynb
 - stable-diffusion.ipynb
- .gitignore
- LICENSE
- README.md

[Preview] README.md Quokka: What's New stable-diffusion-v2.ipynb X

notebooks > stable-diffusion-v2.ipynb > M+ Stable Diffusion

+ Code + Markdown | ▶ Run All ≡ Clear Outputs of All Cells ≡ Outline ...

Stable Diffusion 🎨

Stable Diffusion is a text-to-image latent diffusion model created by the researchers and engineers from [CompVis](#), [Stability AI](#), and [LAION](#). It's trained on 512x512 images from a subset of the [LAION-5B](#) database. This model uses a frozen CLIP ViT-L/14 text encoder to condition the model on text prompts. With its 860M UNet and 123M text encoder, the model is relatively lightweight and runs on a GPU with at least 10GB VRAM.

Getting Started

Install this notebook's requirements and download the pre-trained model from Hugging Face.

PROBLEMS 1E DEBUG CONSOLE TERMINAL PORTS JUPYTER GITLENS

OUTPUT

TERMINAL

```

👉 Welcome to Codespaces! You are on our default image.
  - It includes runtimes and tools for Python, Node.js, Docker, and more.
  - See the full list here: https://aka.ms/ghcs-default-image
  - Want to use a custom image instead? Learn more here: https://aka.ms/codespaces-configure-codespace

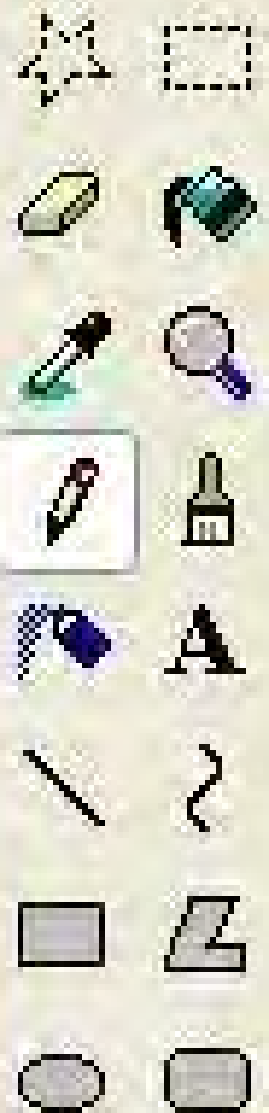
👉 To explore VS Code to its fullest, search using the Command Palette (Command + Shift + P or F1).

👉 Edit away, run your app as usual, and we'll automatically make it available for you to access.

@blackgirlbytes → /workspaces/stable-diffusion (main) $

```

Wallaby.js core v1.0.1372 has been successfully installed.



Recap



- Containers help you standardized environments
- With GitHub Codespaces you can:
 - streamline onboarding
 - code from anywhere
 - standardize environments
 - use templates
 - share forwarded ports
 - perform Data Science and Machine Learning tasks





Thank you!

