Interactive Software Archival

wilkie

@ wilkieii

wilkie@status.wilkie.io

Me

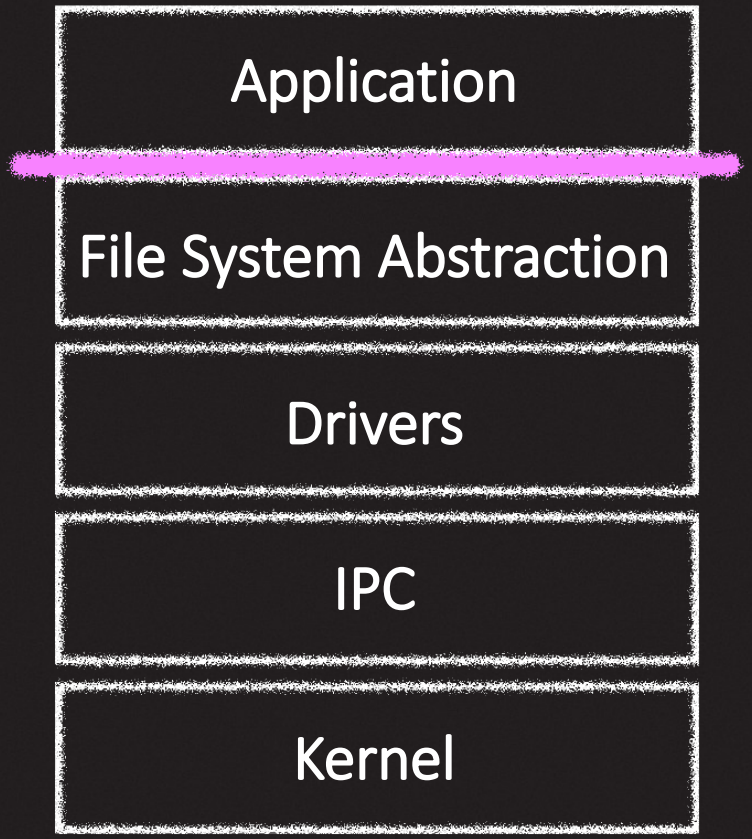
Computers Make Me So Happy Sometimes

Me

Computers Make Me So Grumpy Sometimes

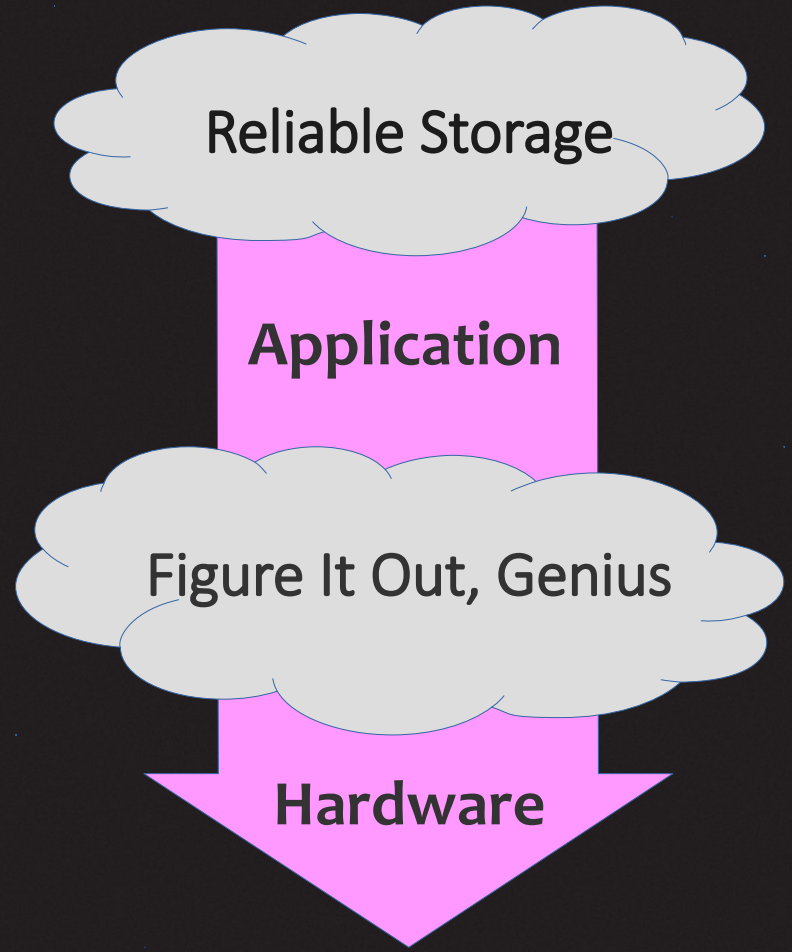
Systems + OSes

Software Is Too Complex



Systems + Archives

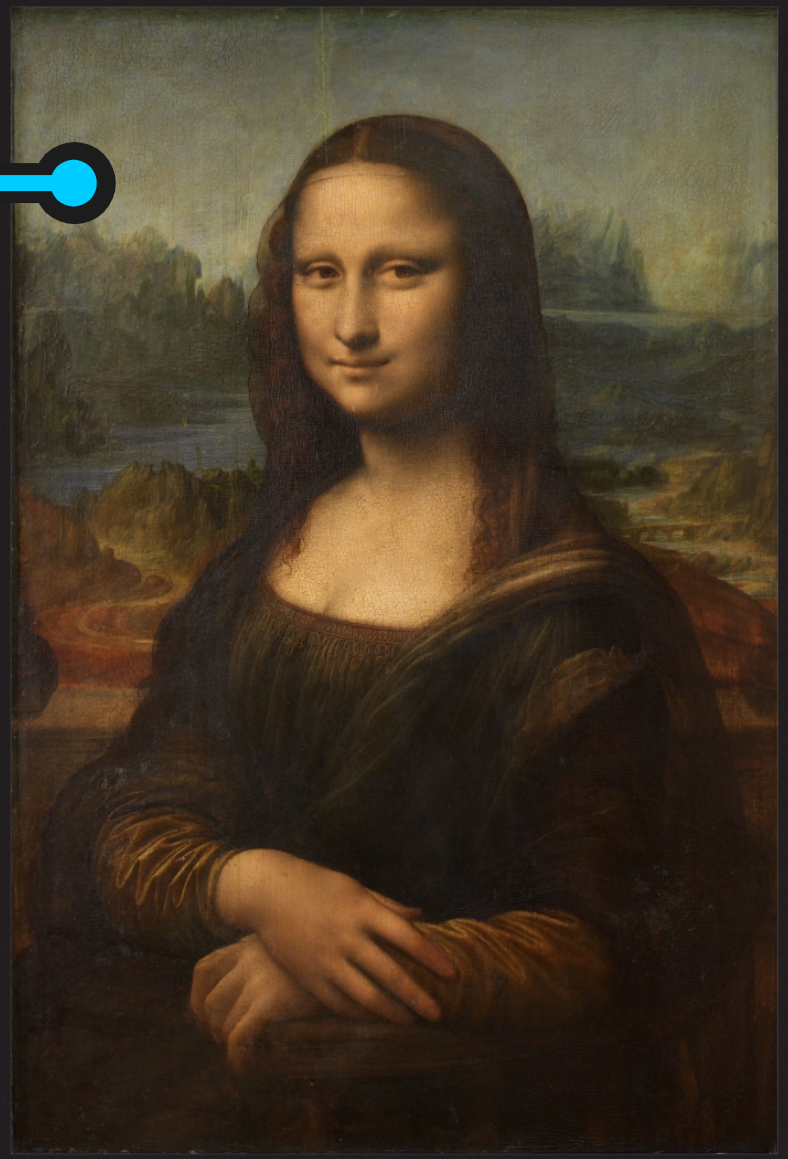
The Ideal System Is an Archive

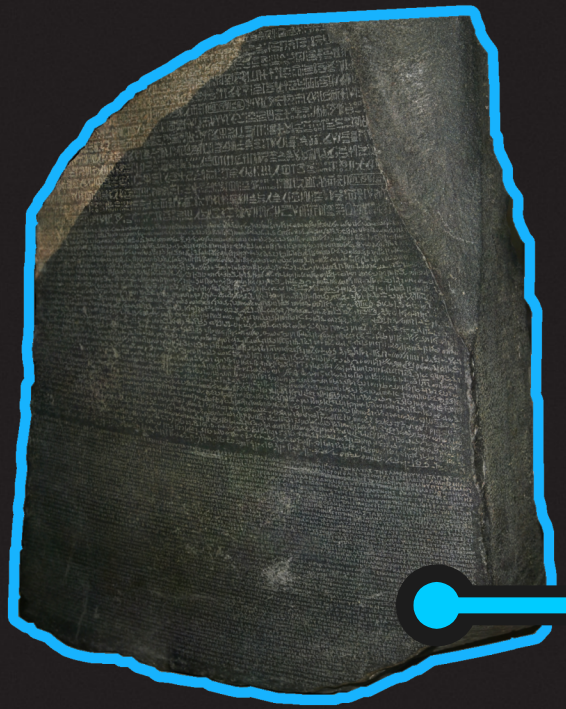


Archival

Artifacts

Mona Lisa





Rosetta Stone

Leaning Tower of Pisa

3.99° of

PRESERVED

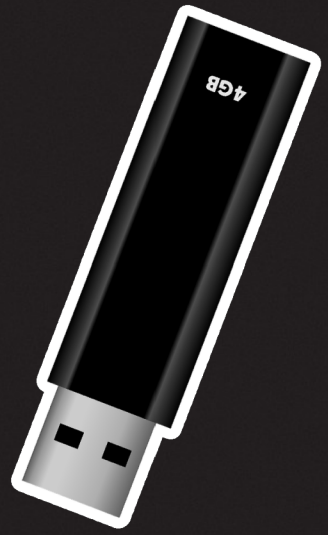
TILT

Provenance

- Even if you've never heard the word, we developers have created a culture around using provenance.
- Software development is sometimes aptly referred to as a Garbage Fire.
- Bundler, npm, pip, CPAN… etc… all solving the problem of the chaos of development through maintaining a record of where and when and who dependencies come from.

Digital Artifacts

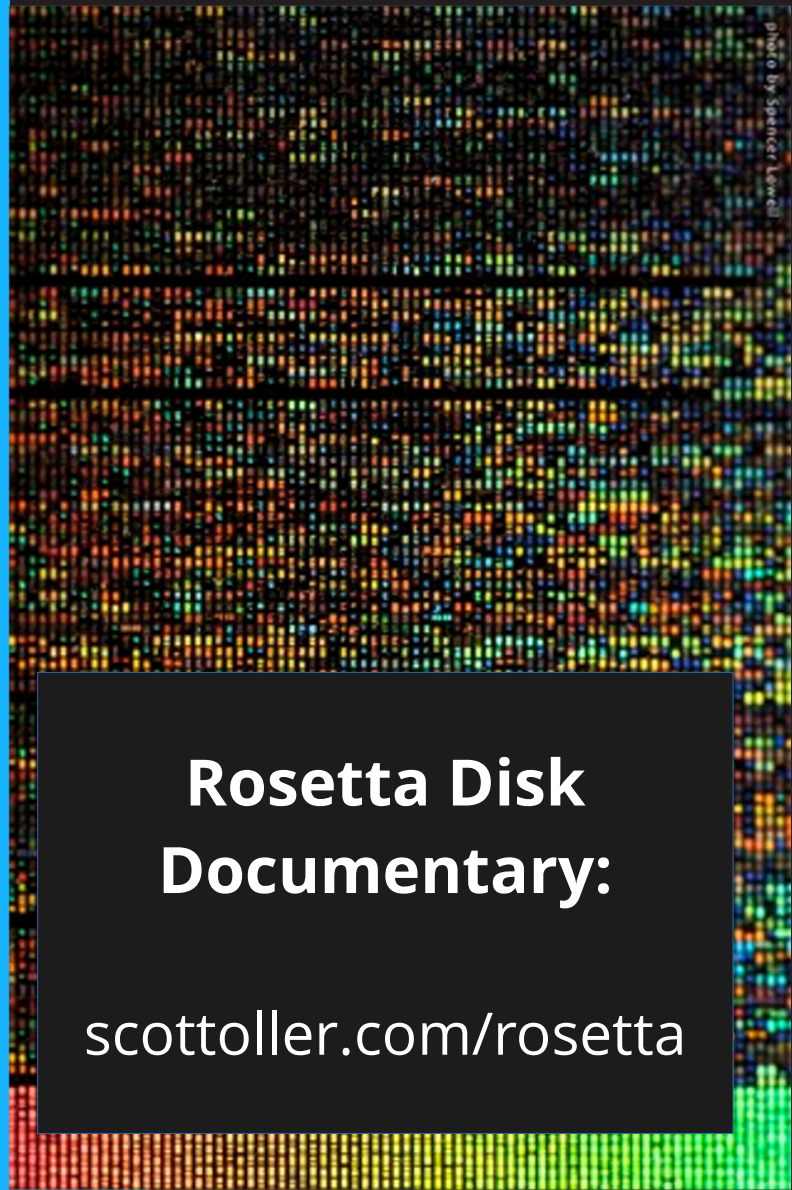
0010
1011
0110



Which Lives Longer?

Digital Archives

HD-Rosetta Disk



Rosetta Disk Documentary:

scottoller.com/rosetta

Software As An Artifact

What is Software?

Ada Lovelace

...the Analytical Engine might act upon other things besides numbers…

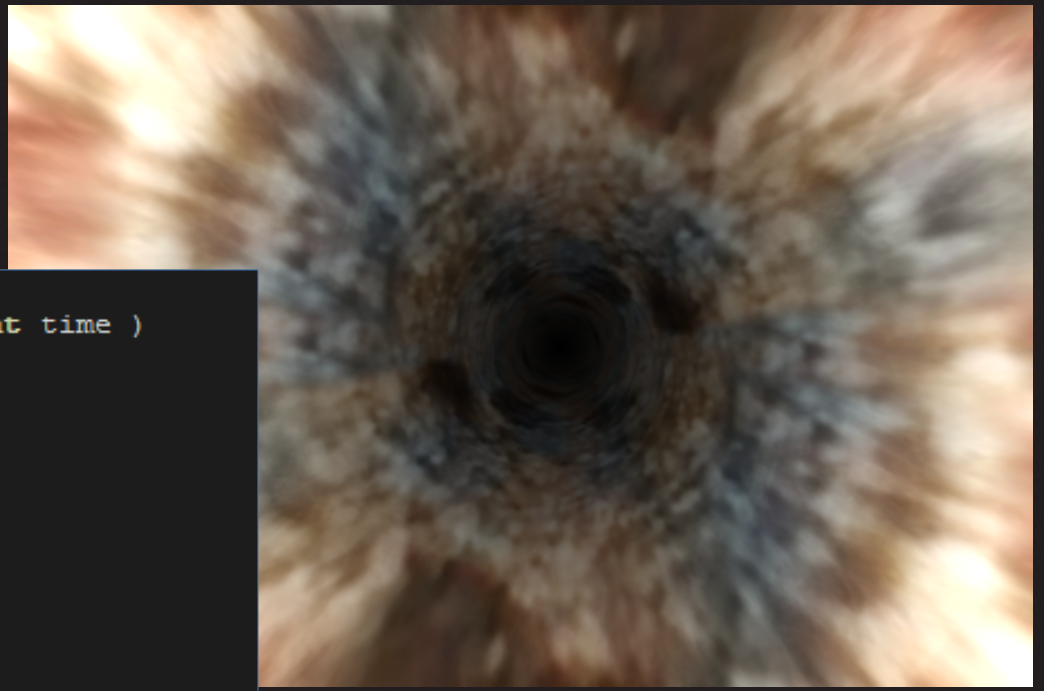
the engine might compose elaborate and **scientific pieces of music** of any degree of complexity or extent.

-- "Notes" Section A, 1842

Ada Lovelace

... **scientific pieces of music** of any degree of complexity or extent.

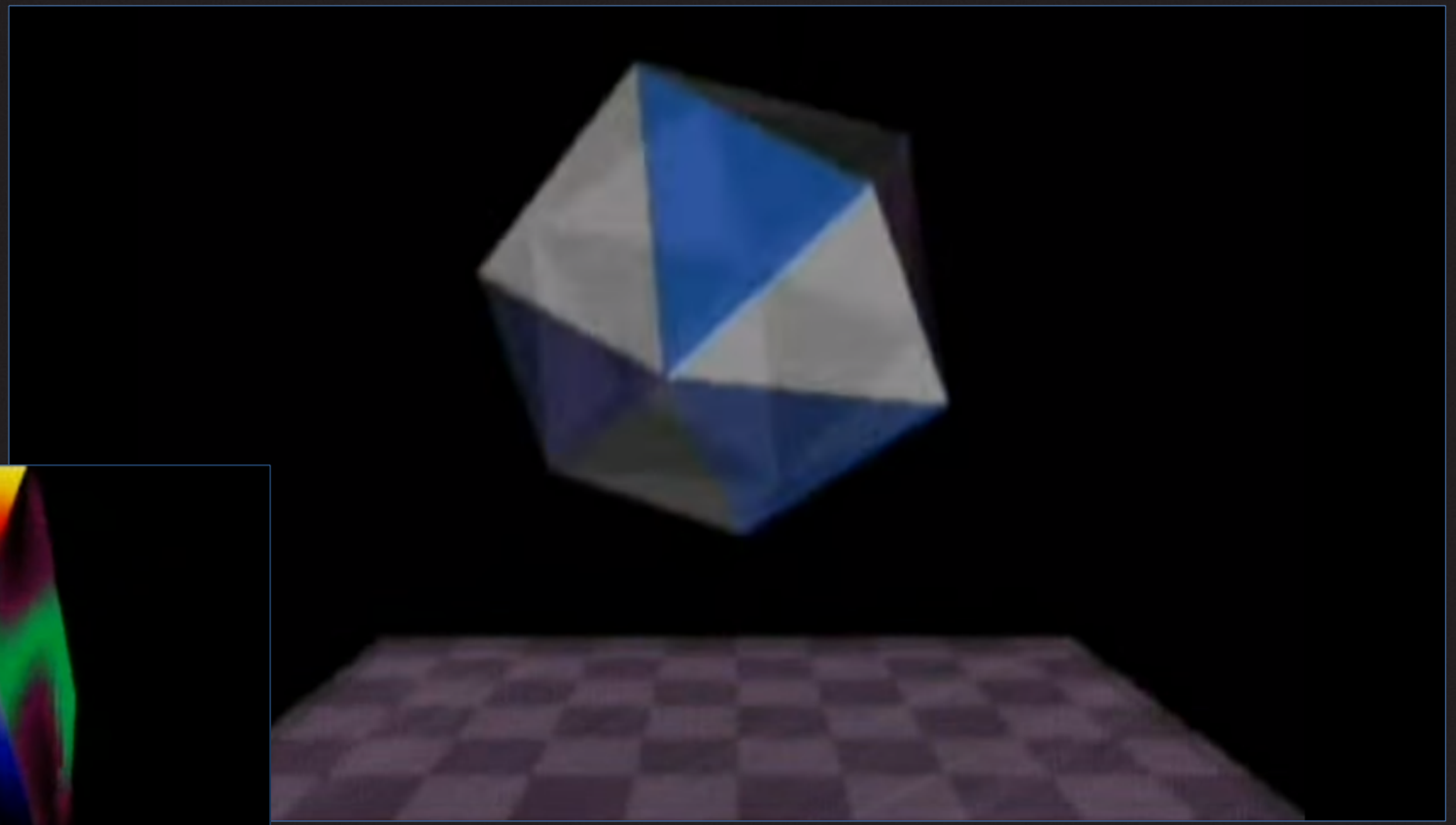
Code as Art

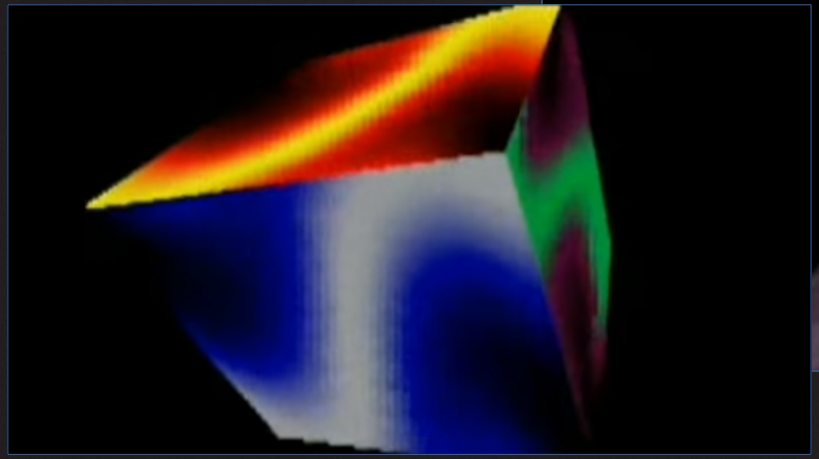


```
vec3 doTunnel( sampler2D sampler, in vec2 uv, in float time )
{
    // get polar coordinates
    float a = atan( uv.y, uv.x );
    float b = atan( uv.y, abs(uv.x) );
    float r = length( uv );

    // pack and animate
    vec2 uvL = vec2( 1.0/r + time, a/3.1415927 );
    vec2 uvR = vec2( 1.0/r + time, b/3.1415927 );

    // fetch from texture
    return textureGrad( sampler, uvL, dFdx(uvR), dFdy(uvR)).xyz;
}
```

Software Piracy Becomes Art

Demoscene



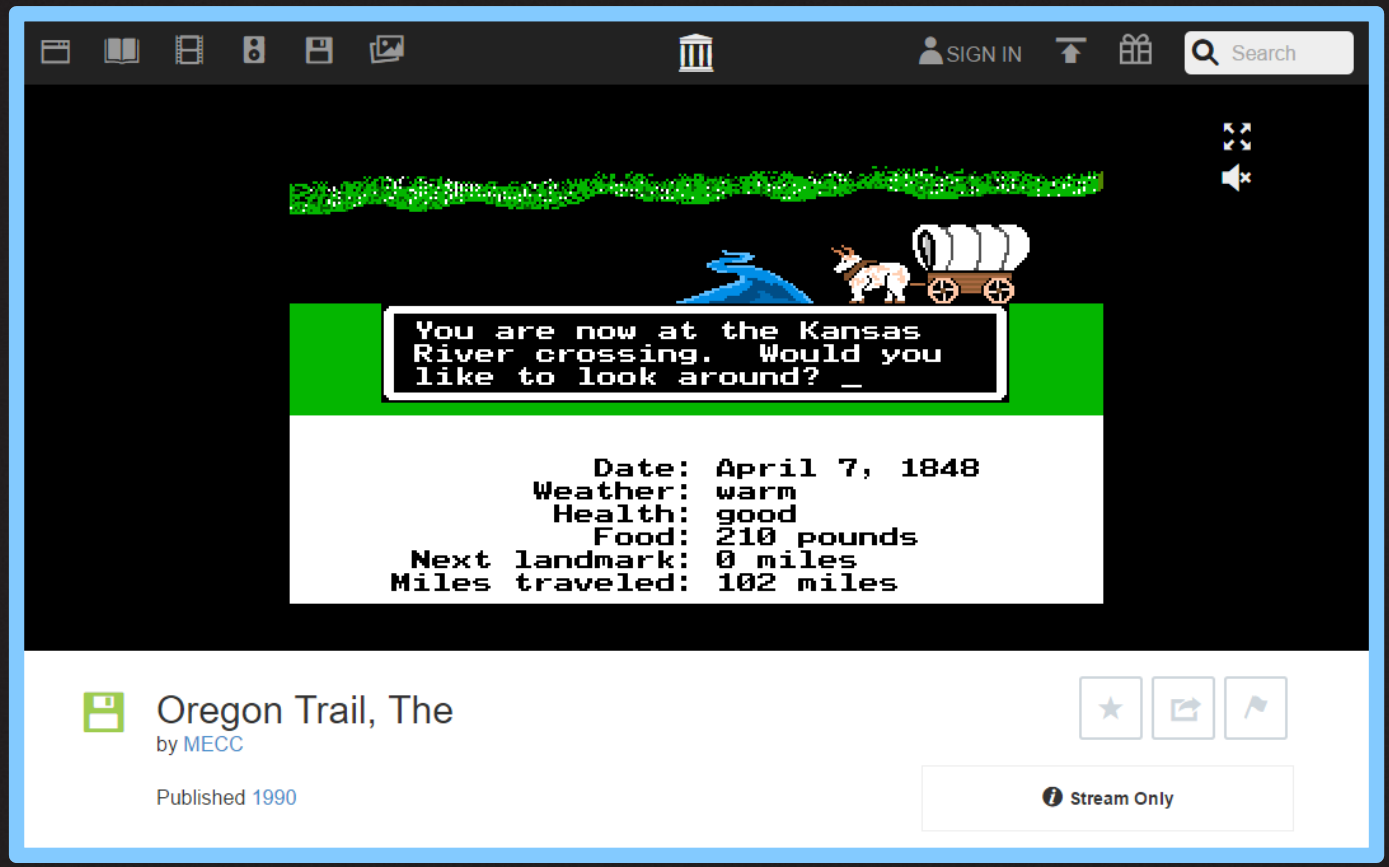


Second Reality by FUTURE CREW

Software as an Artifact

Is software preserved if it cannot be executed?

The Internet Archive



https://archive.org

Trivial Pursuit

by Oxford Digital Enterprises Ltd.

784 | 7 | 1

Zork Zero - The Revenge of Megaboz

by Infocom, Inc.

780 | 17 | 0

Tracon II

by Wesson International

773 | 1 | 0

Fatman - The Caped Consumer

by I/O Product

783 | 3 | 2

Asylum

777 | 5 | 1

Beyond the Black Hole

by Software Toolworks, Inc., The

771 | 5 | 0

Austerlitz 1805

by Cornerstone Software Inc.

Die Hard 2 - Die Harder

by Tiertex Ltd.

781 | 5 | 0

Global Effect

by Millennium Interactive Ltd.

777 | 3 | 0

Trantor the Last Stormtrooper

by Probe Software Ltd.

770 | 2 | 0

Jumpjet

781 | 1 | 0

Premier Manager 2

by Realms of Fantasy

773 | 3 | 0

Apollo 18 Mission to the Moon

by Artech

769 | 2 | 1

Black Sect

by Lankhor

780 | 16 | 0

The Perfect General

by White Wolf Productions

773 | 8 | 2

Indiana Jones in Revenge of the Ancients

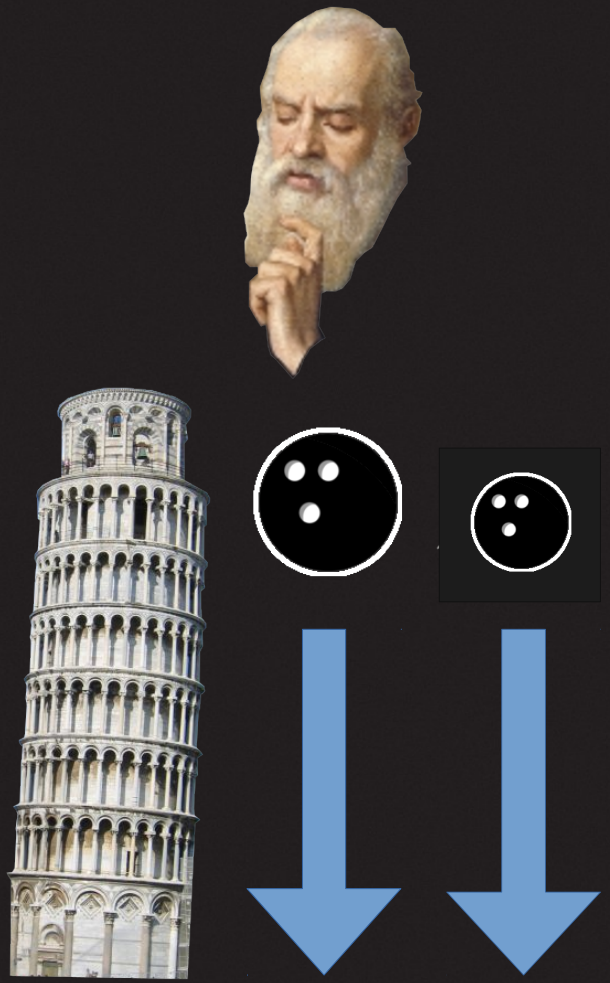
768 | 8 | 0

أبو علي، الحسن بن الحسن بن الهيثم

Abū ʿAlī al-Ḥasan ibn al-Ḥasan ibn al-Haytham

c. 965 – c. 1040 CE

Scientific Method



Form a Question

Propose Hypothesis

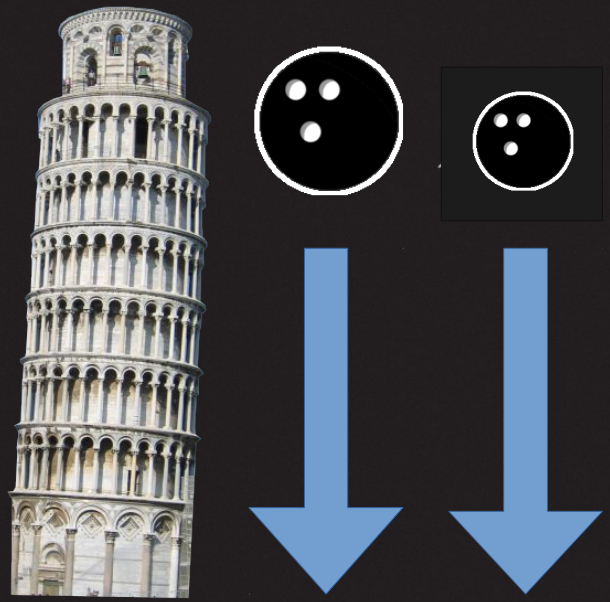
Predict Outcome

Test

Analysis

Record, **Reflect**, ***Repeat***

Repeatablilty



Running the same experiment

Reproducibility

Running the same experiment but altering the conditions

Science + Software

Is science reproducible if you can't run the code?

Sorry...

Pessimistic CS Statistics

32% *Reproducibility Rate*

Of Scientists Believe

90% **Slight/Significant**

Reproducibility Crisis

Dang it

35% Code Publicly Available

22% Asked and received code

36% Asked but told NO

7% Asked but no response

That's a Little Better

58% Got it to Build: <30 minutes

28% Got it to Build: >30 minutes

10% Couldn't build it; told it should

4% Couldn't build it; told it sucks

Excuses

“ Student graduated; Nobody knows how it works ”

Science is an Interactive Narrative

Solution: Archival

Interactive Archival

Solution: Virtualization

“Not a Graveyard” – Erika Linke and Dan Ryan introducing the concept of Olive and executable archives.

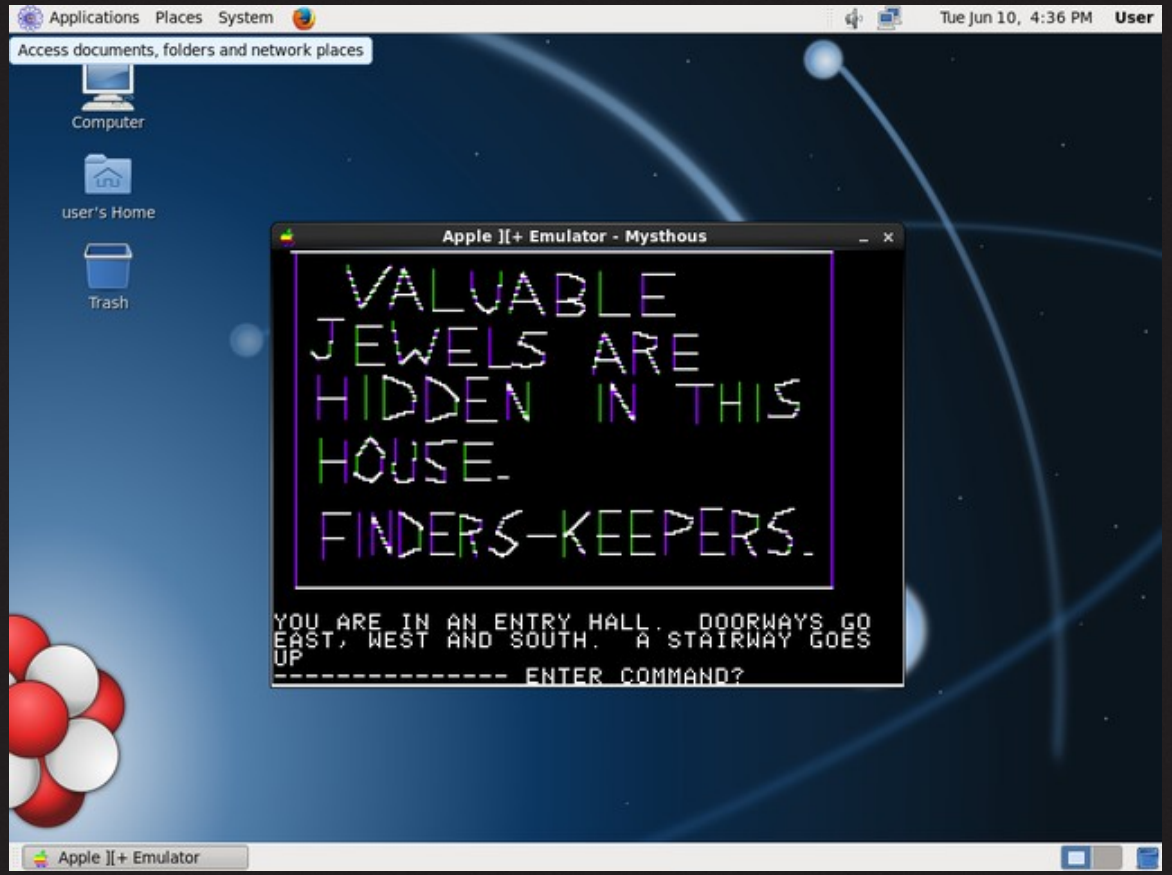
Olive Archive

CMU (Pittsburgh!)

QEMU+KVM

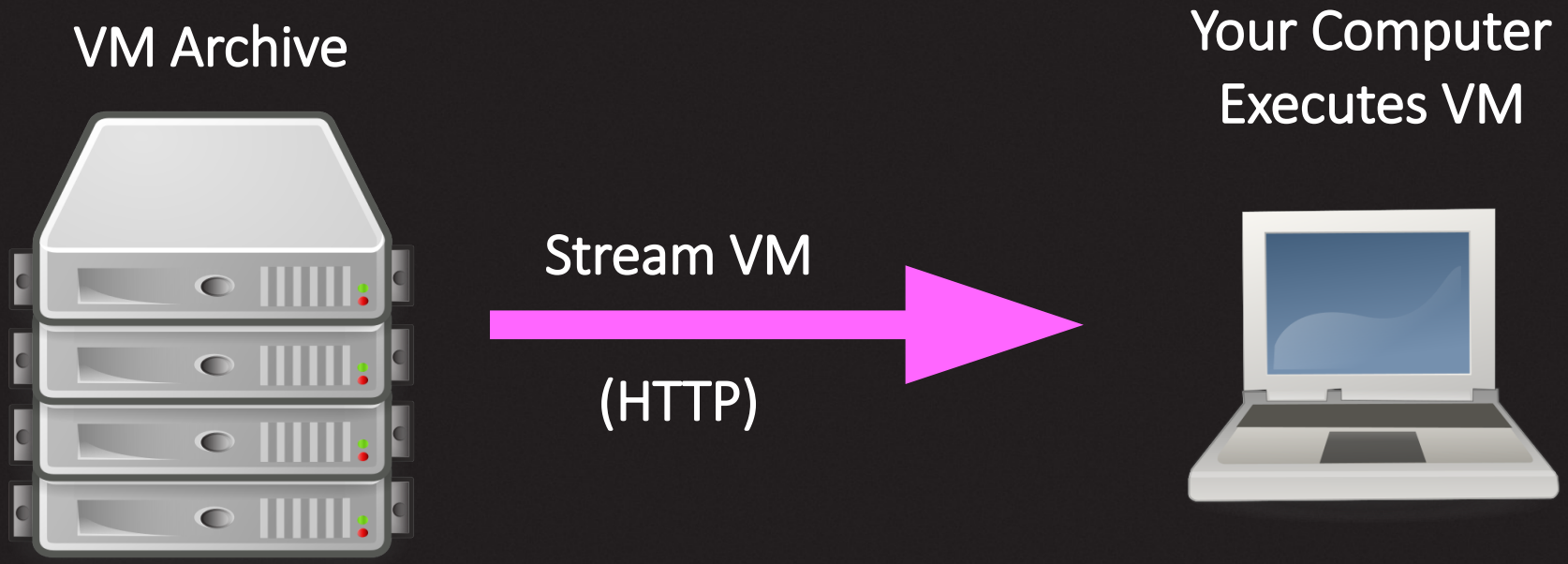
Emulation On Top

olivearchive.org



VmNetX: Internet Suspend/Resume

Virtual Machine Network eXecution; GPLv2



BwFLA

University of Freiburg

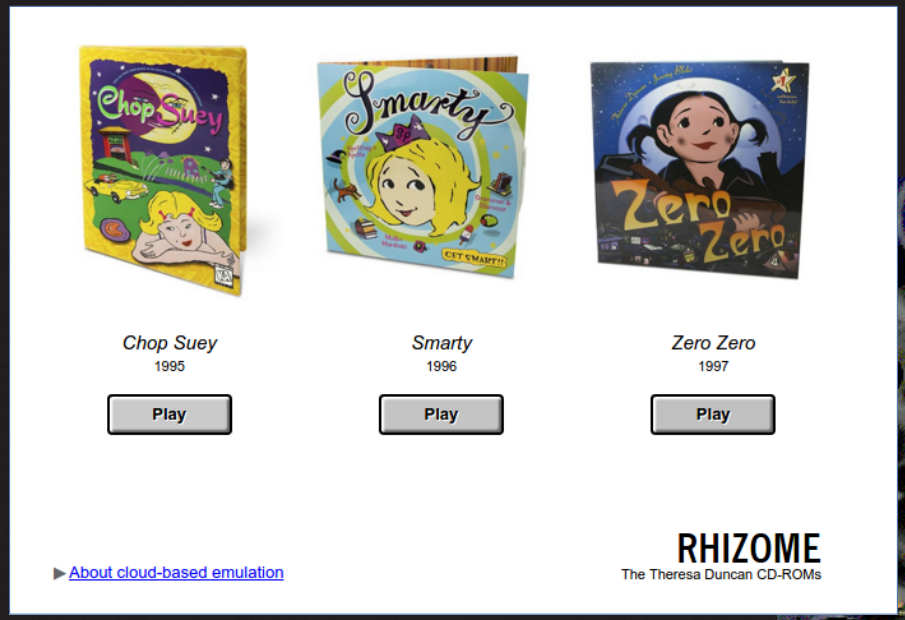
BwFLA

VM Archive

Stream Video

(SPICE, etc)

Your Computer
Sees Video Stream



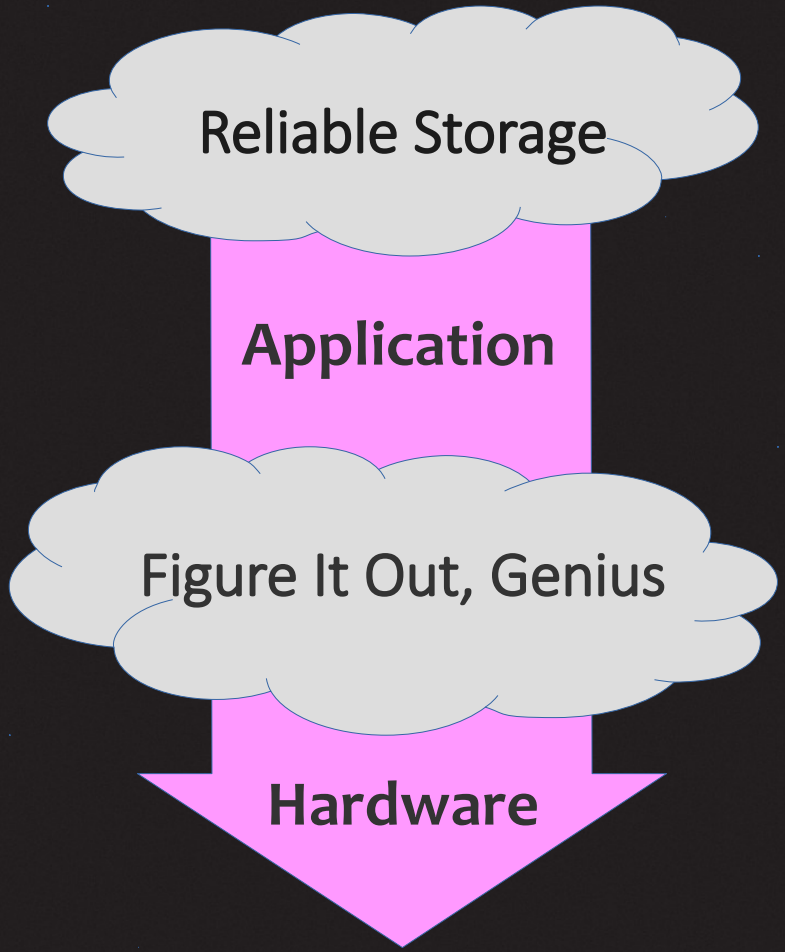
http://bw-fla.uni-freiburg.de/demo-cloud.html

Olive/bwFLA: Drawbacks

Inflexible

What if VM tech is obsoleted?

Solution: Satisfaction



Ex: Commander Keen

1991

Hardware

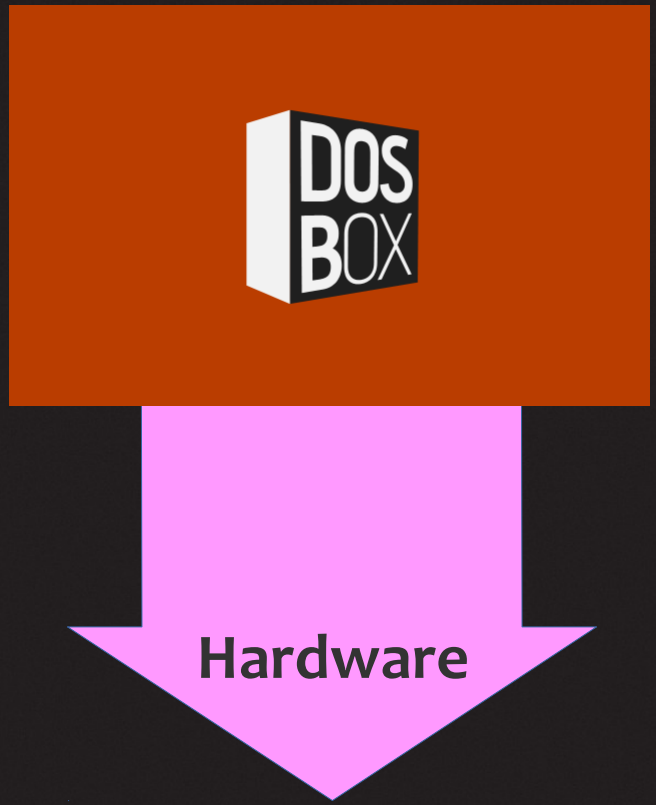
Native DOS -> Impractical

2016

Figure It Out, Genius

Hardware

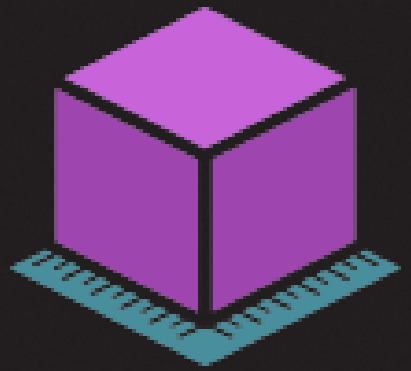
DOSBox



Decide How To Run

DOS BOX

Hardware

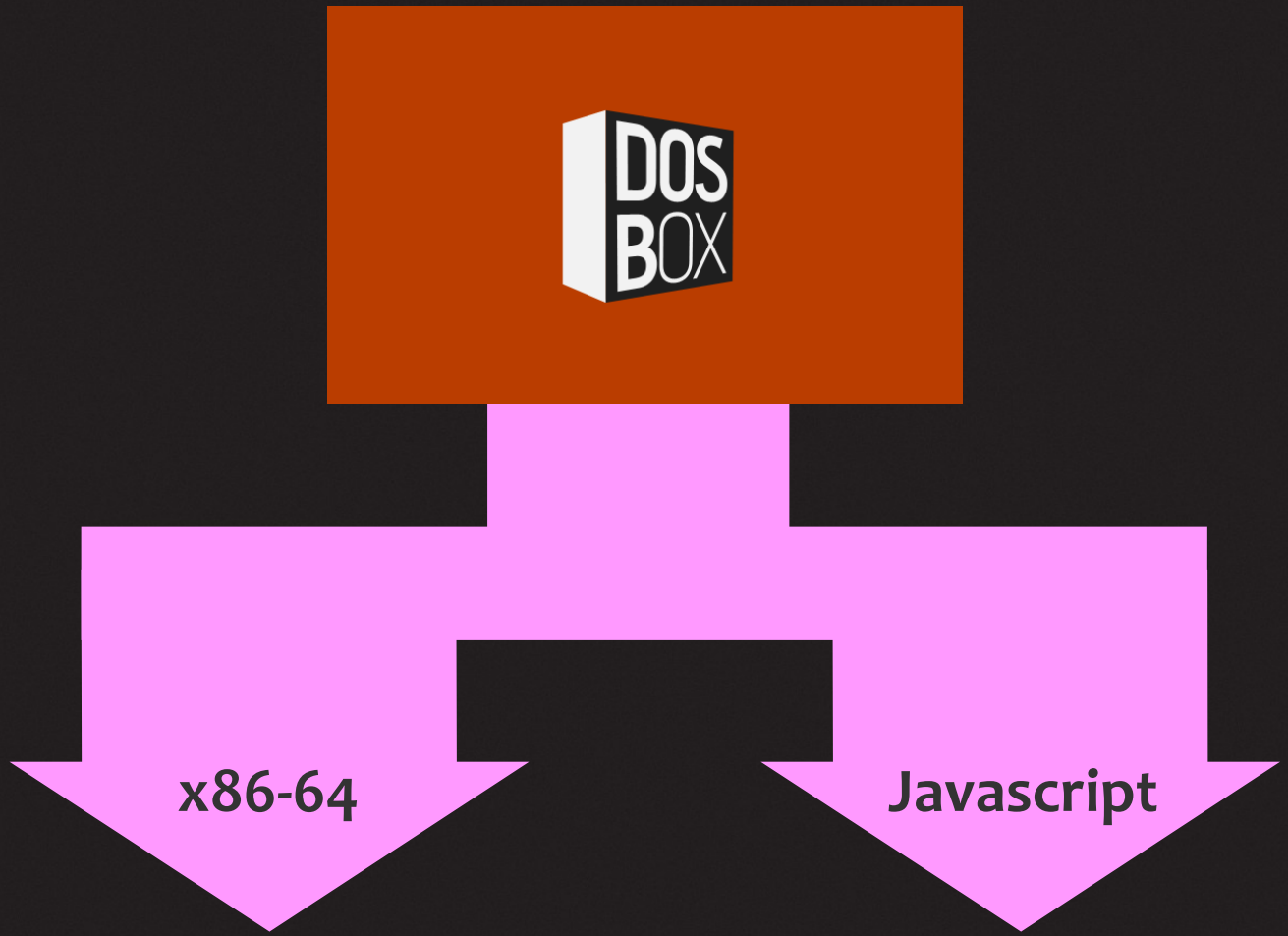


OCCAM

University of Pittsburgh

https://occam.software

React To The Future



Javascript Emulation

DOS BOX

Browser

Adaptable (NES, SNES, etc)

OR

XNES

x86-64

Javascript

Scientific Workflows

Active Curation

Image

Filter

Lessons

Think about how the heck your code works in the future

AND HAVE FUN!

http://wilkie.io/abstractions