

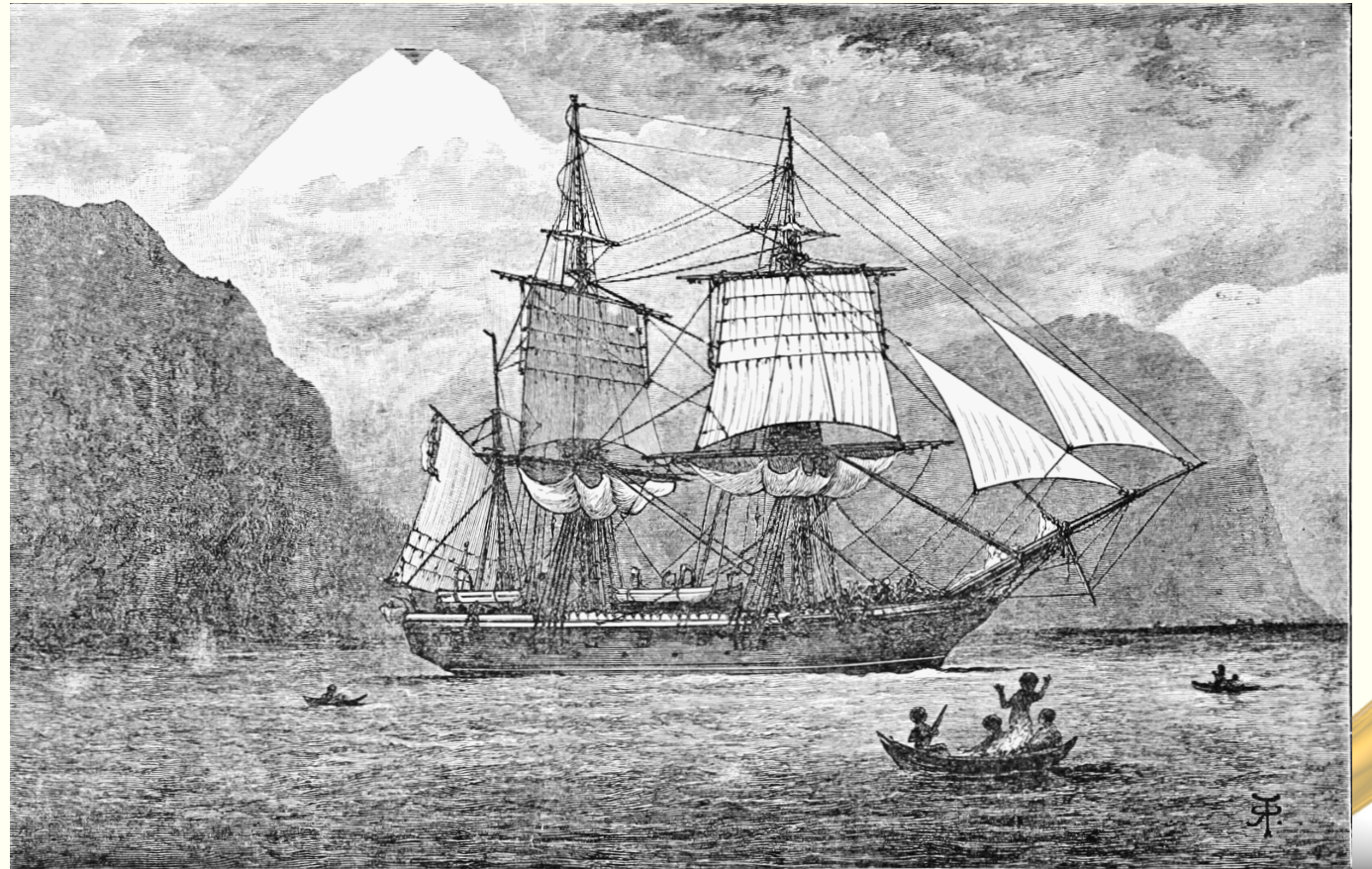
Beagle Smalltalk

David Buck

Simberon Incorporated

HMS Beagle

- The ship Charles Darwin took on his voyage of discovery
- Beagle Smalltalk invites you to take your own voyage of discovery into software



BUYER'S GUIDE TO ANTENNA ROTATORS

14278

Popular Electronics®

WORLD'S LARGEST-SELLING ELECTRONICS MAGAZINE AUGUST 1976 / \$1

EASY-TO-BUILD 1-Hz TO 1-MHz FREQUENCY COUNTER

DX Clubs on International Shortwave

Build A High-Sensitivity Gas and Fume Detector

Learn Electronic Theory with Calculators, Part II


Inexpensive Electronic Keyer Makes Morse Code Easy

TEST REPORTS

Onkyo "Quartz Lock" Stereo Receiver

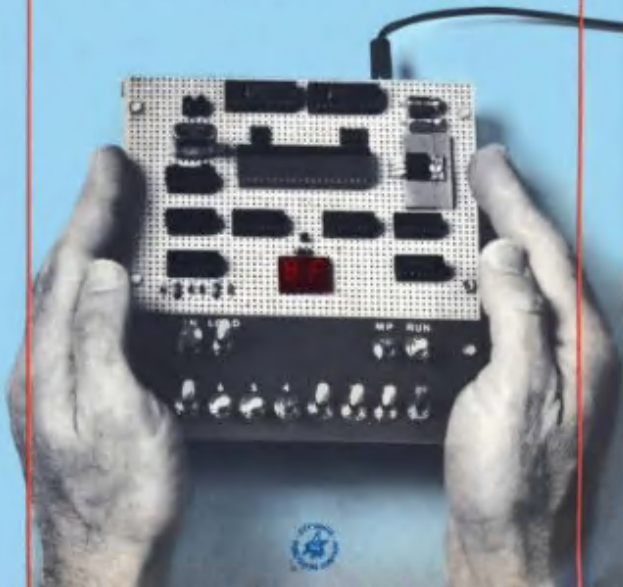
B&O Beogram 1900 Manual Turntable

Realistic Phase-Lock AM/SSB CB Transceiver

ANOTHER  BREAKTHROUGH!

THE COSMAC 'ELF'

A MICROCOMPUTER TRAINER THAT'S POWERFUL, EXPANDABLE AND COSTS AS LITTLE AS \$80.



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BATTERY MONEY-SAVER

"Zap" New Life Into Dead NiCd Batteries

AUDIO

Tape Recorder Hygiene

HOW TO MAINTAIN RECORDERS IN PEAK CONDITION

Build a Low-Cost Pink Noise Generator

A VALUABLE AUDIO TEST TOOL

COMMUNICATIONS

Deciphering Utility Code Broadcasts Without Knowing Morse Code!

TEST REPORTS

Radio Shack STA-2000 Stereo FM/AM Receiver

Koss K-145 Stereo Headphones

Cobra 29XLR 40-Channel AM CB Mobile Transceiver



Two Fantastic Video Projects



BUILD DON LANCASTER'S LATEST "TV TYPEWRITER" It's a \$35 Interface Board



GRAPHICS COMES TO THE "ELF" MICROCOMPUTER! This One's Less Than \$25

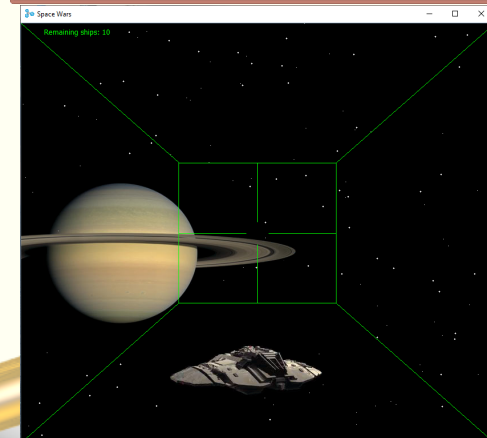
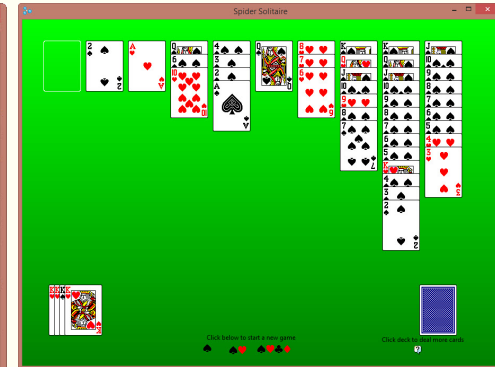
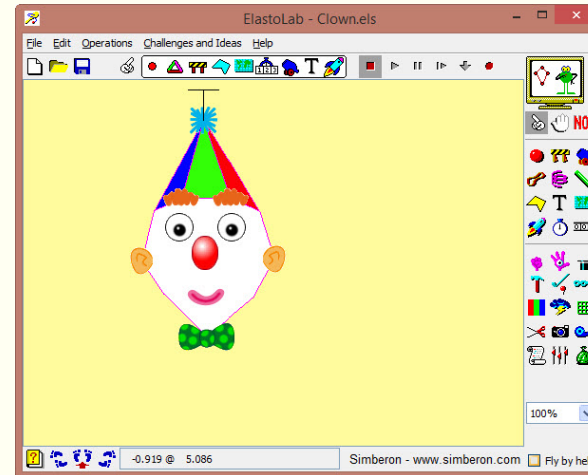


First Computer – COSMAC ELF

- 8-bit RCA 1802 processor running at 1.7897725 MHz
- 8.25K RAM, 256 bytes ROM (later upgraded to 8.25KB)
- 64x64 pixel graphics (up to 64x128)
- Programmed primarily in machine language
- Games (Battlestar Galactica)
- 1 – bit sound and music (square waves)
 - Code turns speaker on/off and counts for delays
- Morse code generator

Other fun software

- Ray tracing – DKBTrace and POV-Ray
- Line art
- 3D graphics
- AI (neural networks)
- Simulated physics (ElastoLab)
- Bots in 3D interactive chat worlds
- Games (Spider Solitaire, Space Wars)



Games for iOS and Android

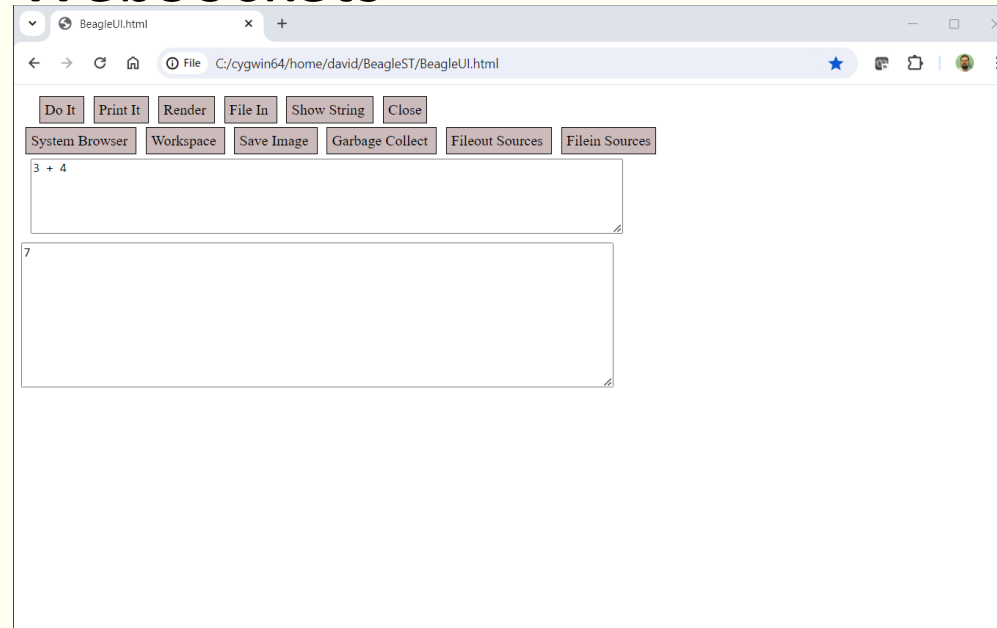
- Wrote my own Smalltalk virtual machine
- Sea Turtle Rescue
 - Interpreted Smalltalk (to avoid iOS restrictions on dynamic compiling)
 - 64 bit executable (an iOS requirement)
 - Cross-compiled from another Smalltalk environment



What to do next?

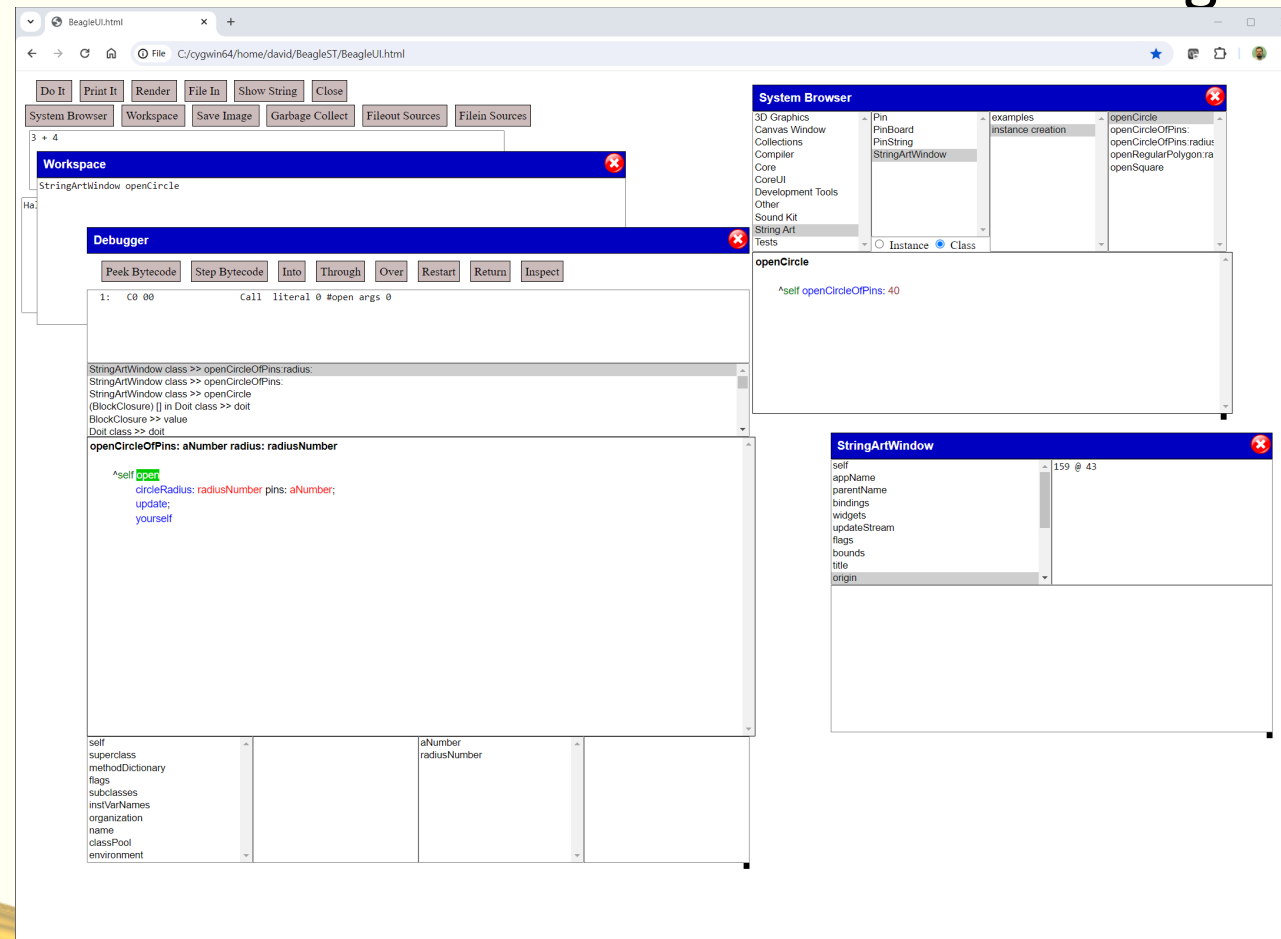
- I decided to take my own voyage of discovery
- Wrote my own Smalltalk compiler hosted on my own VM
- User Interface is a Web Browser like Chrome
- Communication through WebSockets

```
~/BeagleST
David@Simberon-Lenovo ~/BeagleST
$ ./beagle.exe simtalk.im
Image loaded successfully
```



Development Environment

- Developed Smalltalk tools rendered in HTML through JavaScript



Demo

Challenges

- Brain surgery on yourself
 - Changing bytecode set
 - Debugging the debugger
 - Changing the compiler
- Garbage collection
 - Generation Scavenging
 - Mark / Sweep

Kits to Develop

- I build the hard parts
 - let kids explore on top
- Present as YouTube videos – how-to's
 - String Art
 - Puppet Theater
 - 3D Graphics / Ray Tracing
 - Sound synthesis
 - Music generation
 - Digital logic
 - RCA 1802 simulator (or maybe 6809)
 - Simulated physics
 - Neural networks

Philosophies to Explore

- Full source available
 - Smalltalk code is visible and changeable
- Encourage good organization of code (kits, classes, protocols)
- Code visualization?
- Multi-language coding?