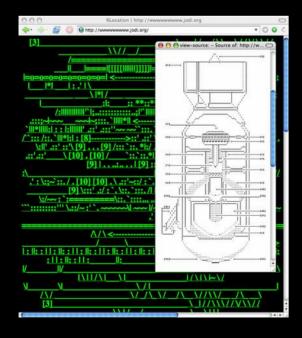# Hardware and Emulation
to Access Creative Computing

Nick Montfort
MIT
http://nickm.com

Director, The Trope Tank
President, The Electronic Literature Organization
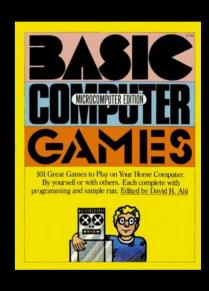
Creative Computing

The Trope Tank

The Electronic Literature Organization (ELO)

e (X) literature
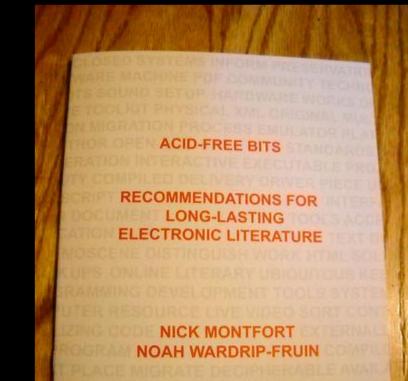
Preservation, Archiving and Dissemination of Electronic Literature

A conference co-sponsored by
Electronic Literature Organization and the Digital Cultures Project

April 3-4, 2003
University of California, Santa Barbara
Interdisciplinary Humanities Center, 6020 HSSB

ACID-FREE BITS

RECOMMENDATIONS FOR
LONG-LASTING
ELECTRONIC LITERATURE

NICK MONTFORT
NOAH WARDRIP-FRUIN

OFFICE OF **DIGITAL HUMANITIES**

Electronic Literature Organization -- Cambridge, MA

HD 51768, *Pathfinders: Documenting the Experience of Early Digital Literature*

Rudyne Grigar, Project Director

Stuart Moulthrop, Project Director

Outright: $52,003

To support: The development of preservation strategies for born digital literature, including capturing reading experiences of both the original authors as well as other readers, all to be incorporated in the Electronic Literature Directory.

Original Hardware & Emulation

Original Hardware	Emulation
Input, output, media can work (almost) as they did	Can save state, allow screenshots, etc., supporting scholarship
Differences (in keyboard layout, video connectors) are made visible	Uses ROM/disc images
Not just the computer: A CRT display ... A modem & phone line? A kitchen?	Smooths over minor but important aspects
	Purpose-built (for gaming)

Original Hardware	Emulation
Input, output, media can work (almost) as they did	Can save state, allow screenshots, etc., supporting scholarship
Differences (in keyboard layout, video connectors) are made visible	Requires ROM/disc images
Not just the computer: A CRT display ... A modem & phone line? A kitchen?	Smooths over minor but important aspects
	Purpose-built (for gaming)

Frame: 272 Scanline: 262
F. Cyc:19912 S. Cyc: 3
VSync Pixel Pos: -59
VBlank Color Clk: 9

PC: F81A
SP: FF 255 11111111 00
A: 00 0 00000000 0284
X: 00 0 00000000 FA
Y: 82 130 10000010 00
PS: N v - B d I z C Src Addr

Step
Trace
Scan +1
Frame +1
Exit

00xx 0 1 2 3 4 5 6 7 8 9 A B C D E F
80 00 82 40 82 FF 00 FF 00 07 00 00 1E 00 00 45 C5
90 45 45 05 05 00 00 01 04 06 04 00 00 35 B5 50 00
A0 00 00 09 07 0A 05 07 07 07 23 23 23 58 58 5C 00
B0 00 00 B4 4C 00 FE 01 FF FF 0F 00 FC 07 01 14 A8
C0 58 FB 01 14 A8 58 FF 0F FE 0F FE 49 FF 58 FB 58
D0 FB 58 FB 58 FB 58 FB 08 FB 07 FD 58 FC 58 00 58
E0 00 58 FF 58 FF 58 FF 00 FF 4E 81 00 00 00 D6 1C
F0 06 1E E9 00 00 00 00 00 00 00 00 00 FF FF FA F3

Undo
Rev
Srch
Cmp

Label: Dec: 0 Bin: 00000000

Current bank (1 total): 0 Resolve data: Automatic

| Prompt | TIA | I/O | Audio |

PF BL M1 M0 P1 Strobes:
COLUP0: 1C P0 □ □ □ □ □ WSync RSync
COLUP1: 1C P1 □ □ ☒ □ □ ResP0 ResP1
COLUPF: 1E M0 □ □ □   ResM0 ResM1
COLUBK: 06 M1 □ □   ResBL HMove
            BL □   HmClr CxClr

P0: GR: ████████ Pos: 38 HM: 0 □ Reflect □ Delay
    NusizP0: 3 3 copies - close (8)

P1: GR: ████████ Pos: 40 HM: 0 □ Reflect ☒ Delay
    NusizP1: 3 3 copies - close (8)

M0: □ Enable Pos: 9F HM: 0 Size: 0 □ Reset
M1: □ Enable Pos: 29 HM: 0 Size: 0 □ Reset
BL: □ Enable Pos: 63 HM: 0 Size: 1 □ Delay
PF: ████████████████████
    ☒ Reflect □ Score □ Priority

F81A   LDA   #$2B   ;2   A9 2B
F81C   STA   TIM64T   ;4   8D 96 02
F81F   LDA   SWCHB   ;4   AD 82 02
F822   LSR   A   ;2   4A
F823   BCS   LF82E   ;2   B0 09
F825   LDA $80   ;3 *   A5 80
F827   STA $F4   ;3 *   85 F4
F829   LDX   #$F7   ;2 *   A2 F7
F82B   JMP   LF004   ;3 *   4C 04 F0
LF82E   LSR   A   ;2   4A
F82F   BCS   LF84C   ;2   B0 1B
F831   DEC $81   ;5 *   C6 81
F833   BPL   LF84E   ;2 *   10 19
F835   LDA $80   ;3 *   A5 80
F837   EOR   #$01   ;2 *   49 01
F839   STA $80   ;3 *   85 80
F83B   STA $F7   ;3 *   85 F7
F83D   STA $F4   ;3 *   85 F4
F83F   ASL   A   ;2 *   0A
F840   ASL   A   ;2 *   0A
F841   ASL   A   ;2 *   0A
F842   ADC   #$08   ;2 *   69 08
F844   JSR   LFF0C   ;6 *   20 0C FF
F847   JSR   LFF97   ;6 *   20 97 FF
F84A   LDY   #$1E   ;2 *   A0 1E
LF84C   STY $81   ;3   84 81
LF84E   LDA $C6   ;3   A5 C6
F850   BMI   LF85A   ;2   30 08
F852   CMP   #$30   ;2   C9 30
F854   BNE   LF85D   ;2   D0 07
F856   LDA   #$BB   ;2 *   A9 BB
F858   STA $BA   ;3 *   85 BA

Original Hardware	Emulation
Input, output, media can work (almost) as they did	Can save state, allow screenshots, etc., supporting scholarship
Differences (in keyboard layout, video connectors) are made visible	Requires ROM/disc images
Not just the computer: A CRT display ... A modem & phone line? A kitchen?	Smooths over minor but important aspects
	Purpose-built (for gaming)

10 PRINT in Emulation

Conclusion

Use both.

Scholars/Creators & Arcivists/Preservationists

Nick Montfort

http://nickm.com
nickm@nickm.com