The PLATO Computer System

David Eckhardt
Bruce Maggs

15-410 Gratuitous Quote of the Day

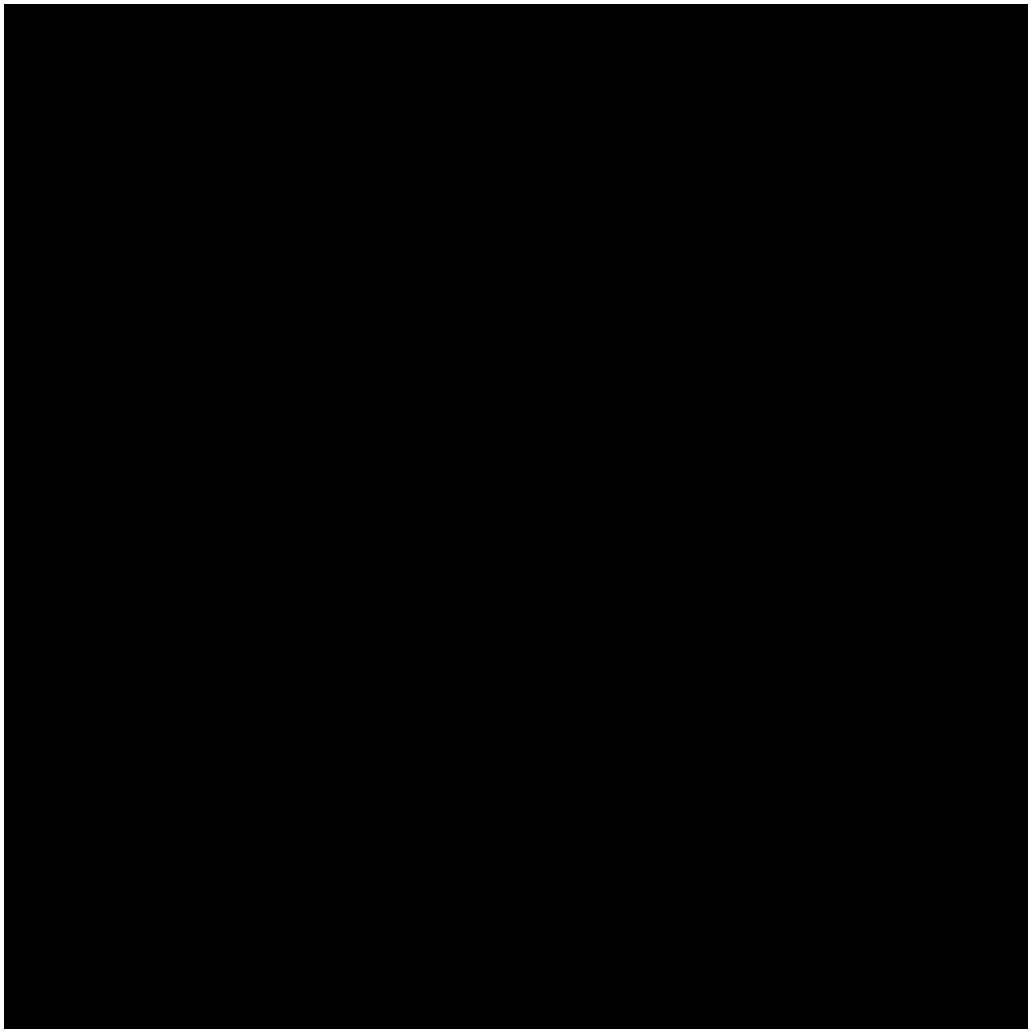
In 1960 it became apparent to me and others that the school systems, in the larger inner-city schools, were turning out students that were likely to be functionally illiterate in our society. And I was very interested in knowing if it was possible for using our new upcoming computer technology for helping solve this problem.

-Donald Bitzer

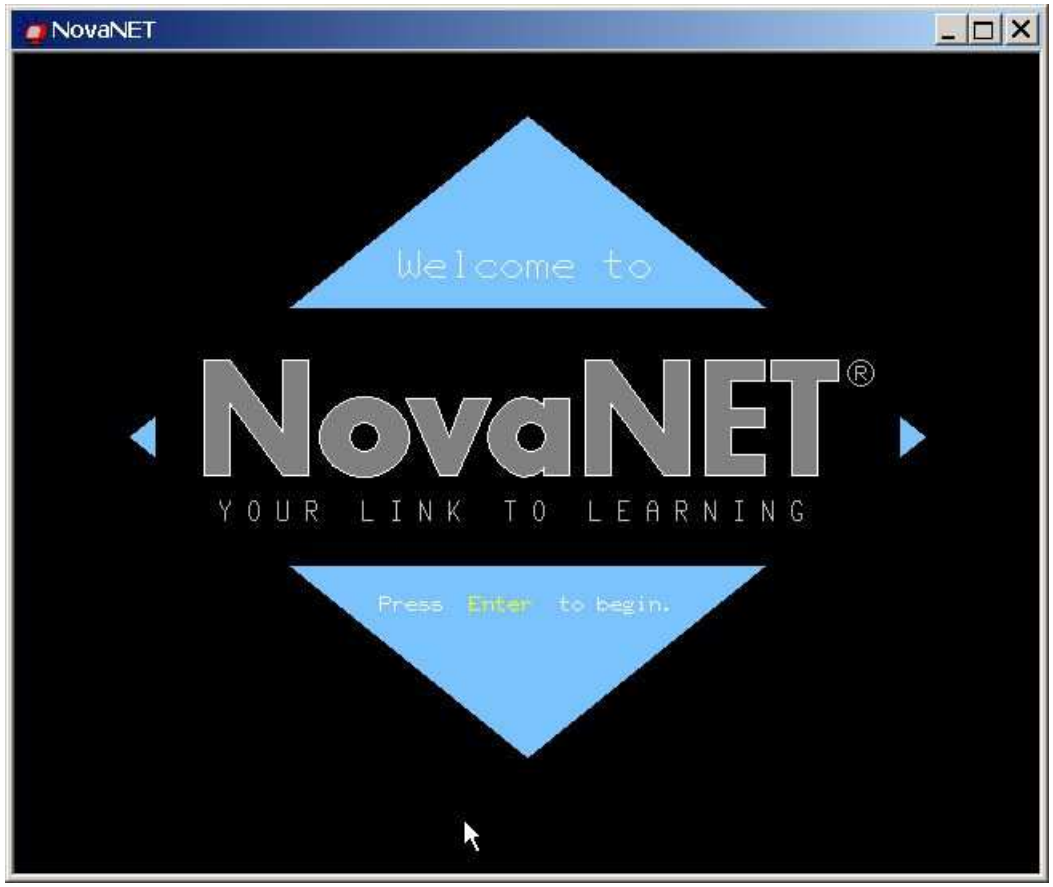
Time Line

- PLATO IV Developed by the University of Illinois and the Control Data Corporation
- 1961 timesharing PLATO II begins
- 1964 invention of plasma panel
- 1968 PLATO IV begins
- Spun off as “NovaNET” late 1980’s
- Revived at www.cyber1.org

Login Screen



NovaNET


NovaNET
Welcome to
NovaNET®
YOUR LINK TO LEARNING
Press Enter to begin.

Innovations

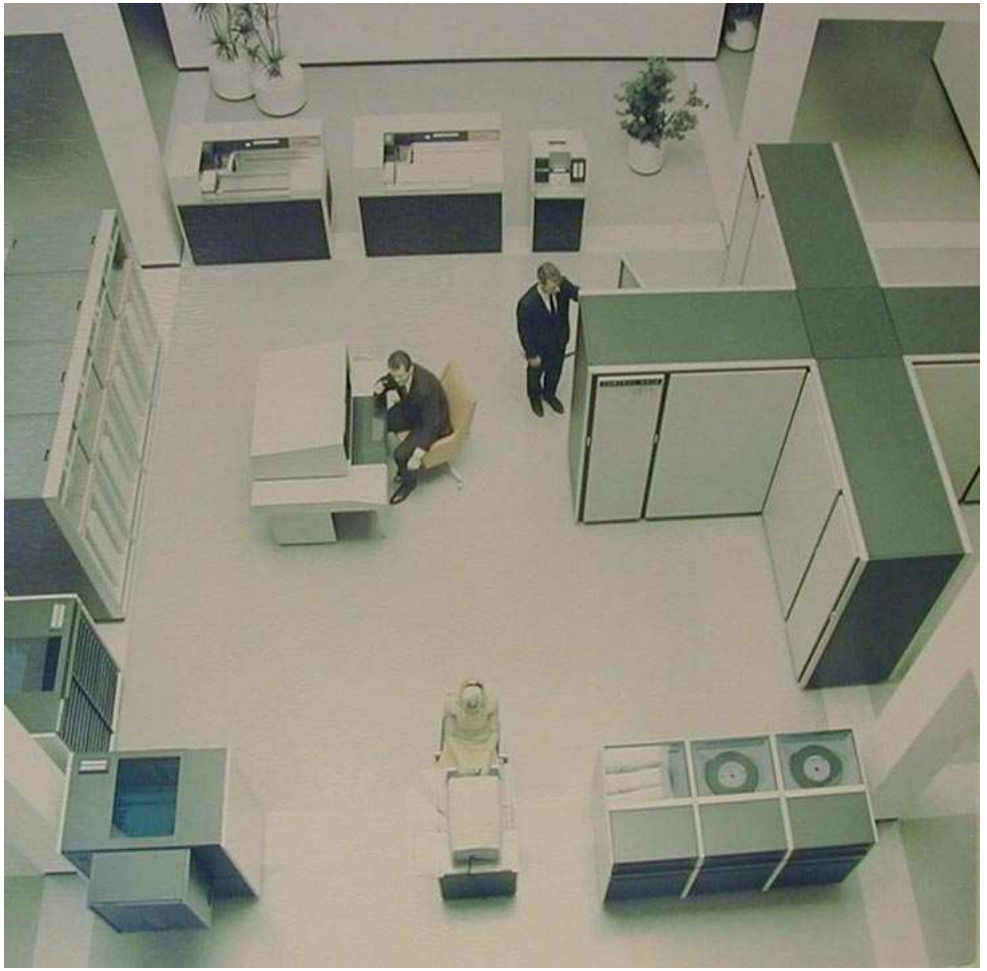
- first LARGE on-line community
- invention of the plasma panel
- multimedia
- “personal notes” –email
- “group notes” –newsgroups
- “consulting mode” –like PC anywhere
- widely used “term talk” (like Unix talk)
- multiplayer graphical games
- IBM correctly attributes Lotus Notes to PLATO

Hardware

- Control Data mainframes designed by Seymour Cray
- Cyber 70, 176, CDC 6600, 7600
- Magnetic core memory
- 60-bit words, 6-bit characters
- One’s-complement arithmetic
- Up to 1000 simultaneous users
- (NovaNET runs on Alpha today?)

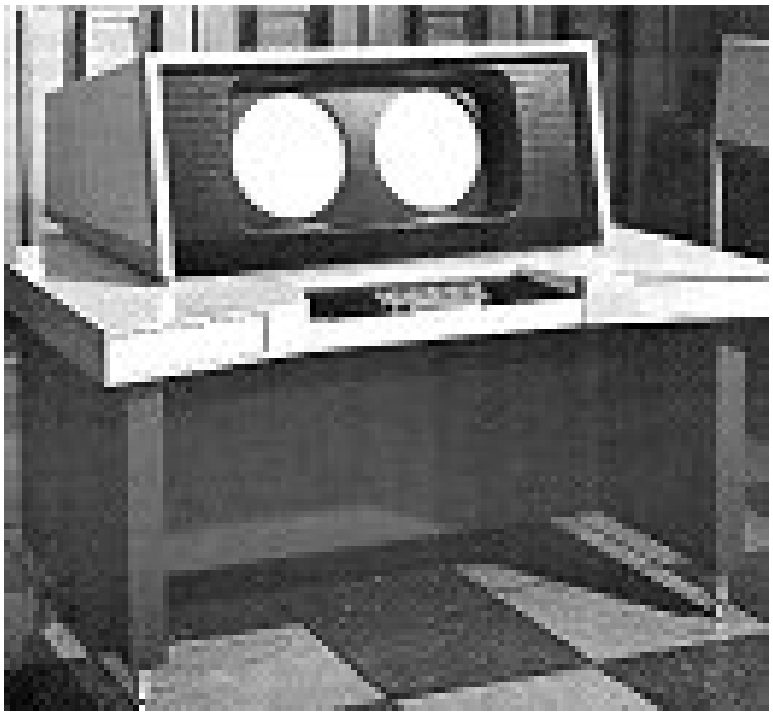
CDC 6600

- $6,891,300
- 131K words
- four arms:
  - CPU
  - memory
  - peripheral processors
- “small” disks (previously 1m)



http://pages.sbcglobal.net/couperusj/CDC6600.html

Operator's Console

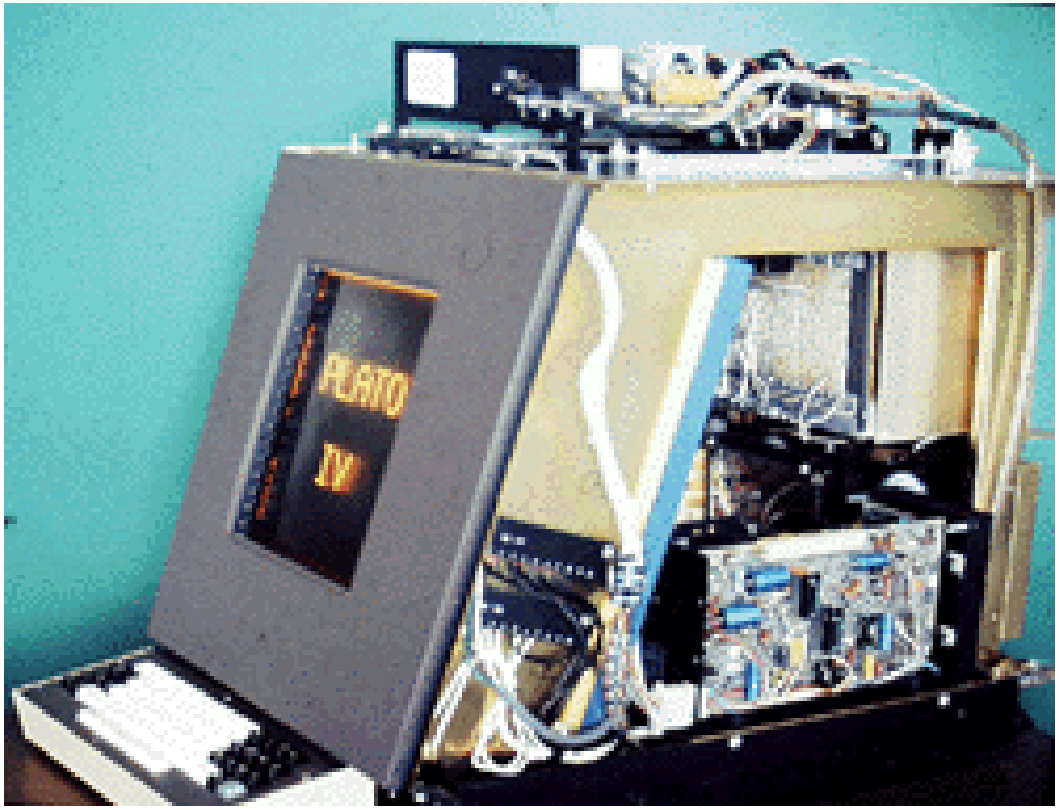


http://pages.sbcglobal.net/couperusj/CDC6600.html

PLATO IV terminal

- 512 x 512 pixel plasma (neon gas) panel
- screen is a write-only memory
- Bitzer, Slottow, Willson, won emmy for invention of plasma panel (2002)
- 1200-baud connection
- built-in touch panel
- built-in rearview slide projector
- external audio device (large read-write floppy disks)

PLATO IV Terminal



From http://www.chem.uiuc.edu/clcwebsite/history.html

Terminal Commands

- Load customizable character set
- Display text at coordinate
- Draw a line between a and b
- Implemented in hardware

PLATO V Terminal

- Plasma panel and CRT versions
- Same 512 x 512 display
- 8080 processor implemented all graphics

PLATO IV Terminal

From http://plato.filmteknik.com/

File System

- Global namespace (no directories!)
- 8-character file names (no extensions)
- File types
  - Tutor programs
  - Datasets
  - Namesets
  - Notesfiles
  - Groups

TUTOR Programming Language

- All “lessons” written in TUTOR
- Interpreted
- Program size limited by memory constraints
- Apparently not designed by computer scientists
- (FORTRAN and assembly code available to system programmers)

Early Tutor

- 150 variables
  - n1, …, n150 (integers) or
  - v1, …, v150 (floating point)
- Could assign names to these variables
- “jump” between “units” (like C functions)
- “do loop” (like C for loop)
- “conditional branch” (a.k.a. goto)

Arrow command

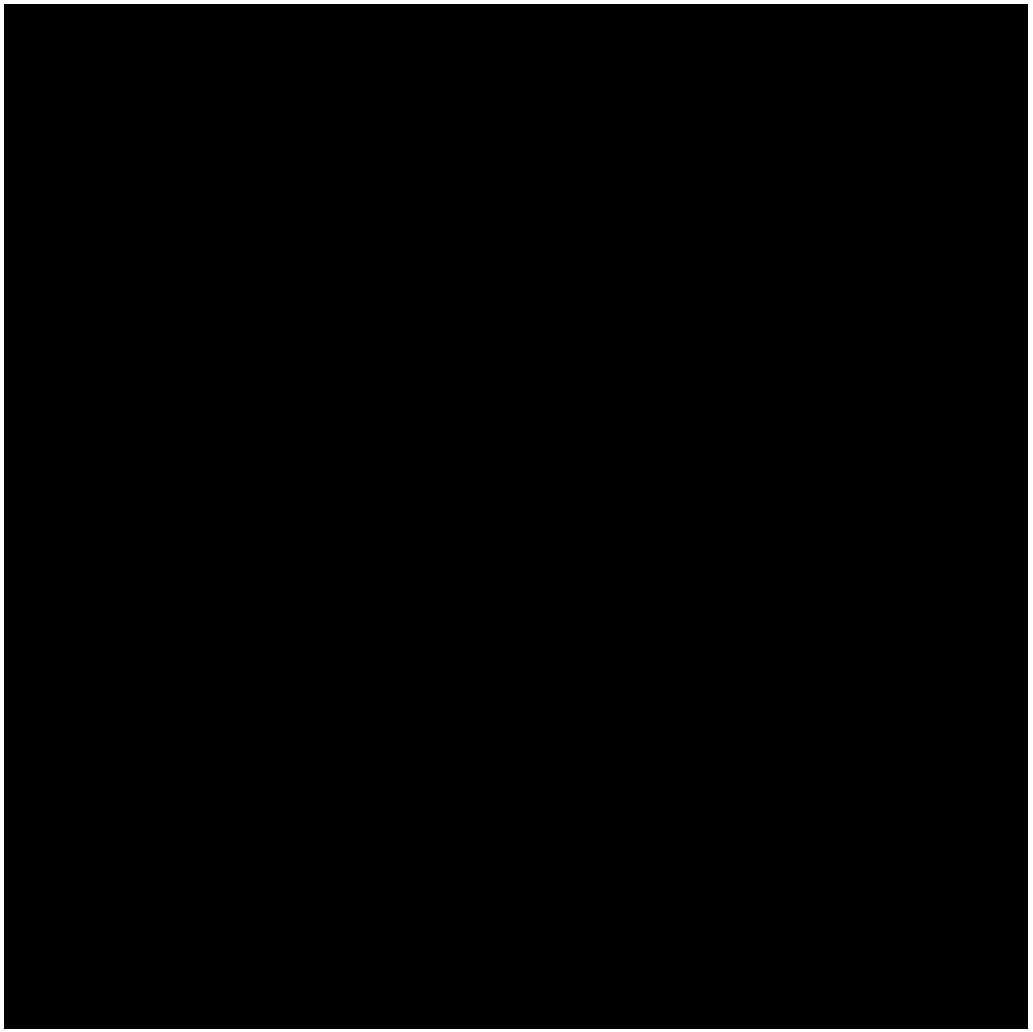
- Built in support for accepting input, providing feedback

```
at      1010
write   Was plan9 a good idea?
arrow   1110
answer  no
write   Don't tell Dave!
wrong  yes
write  You must mean the movie.
endarrow
```

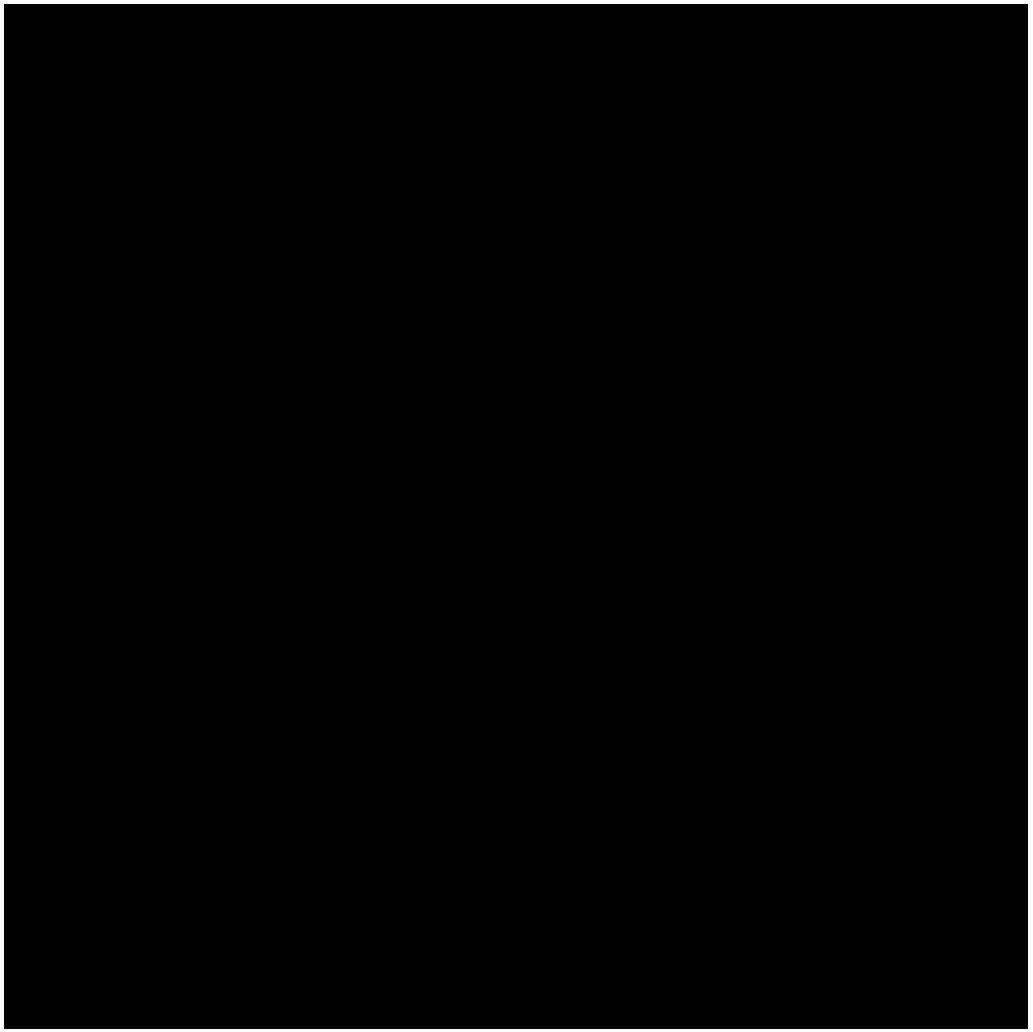
TUTOR Improvements

- “do” (call a function) - stack depth 10
- return values
- recursion
- local variables
- if, else
- while, repeat until

Users and Groups



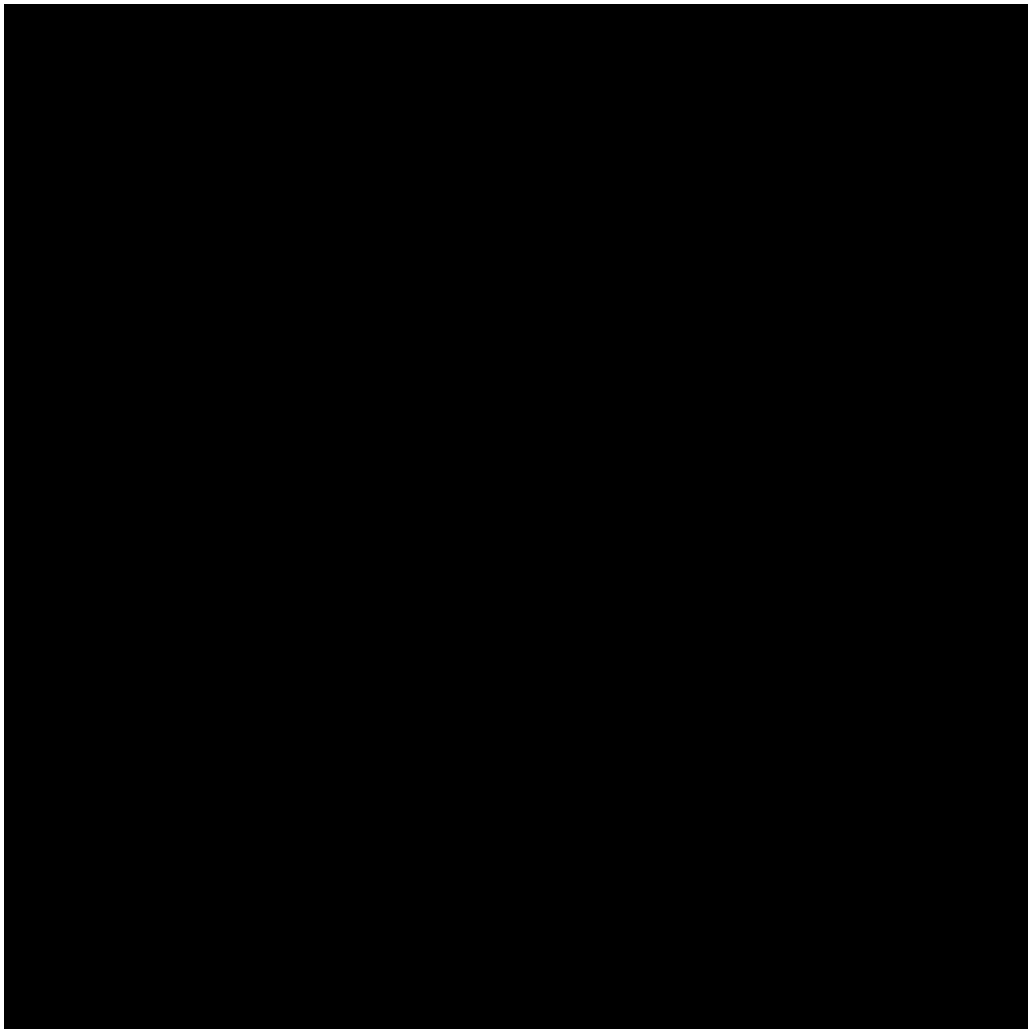
On-line Community



Privileges

- Student Mode
  - Can only run programs
- Author mode
  - Can run programs, edit files
- Super users
  - Members of groups s, p, o, e

Author Mode



Foreground vs. Background Modes

- Foreground mode limited to 10 TIPS (Thousand Instructions Per Second)
- Background mode: no guarantees, but also no limits on CPU share; don’t try during the day
- Disk access rate about 10 DAPM (Disk Accesses Per Minute) frowned upon

Concurrency Primitives

- No mutexes, semaphores, etc.
- Undocumented feature: time slice will not be interrupted in straight-line (i.e., no backwards branches) calc code

```
loop
.       if mutex = 0
.       .       mutex ⇐1
endloop
.       end
end
```

The branch q purge

- Branch q branched to end of straight-line code (or something like that)
- System was taken down
- All TUTOR files were scanned
- branch q replaced by branch to explicit label

Common Memory

- Upto 8000 words shared by all users of a lesson
- Persistent, backed by disk
- Could load up to 1500 words into core storage (memory) at any time, nc1, …, nc1500 or vc1, …, vc1500
- Provided communication between multiple users of a program, e.g., between players in a game

Multiplayer Games

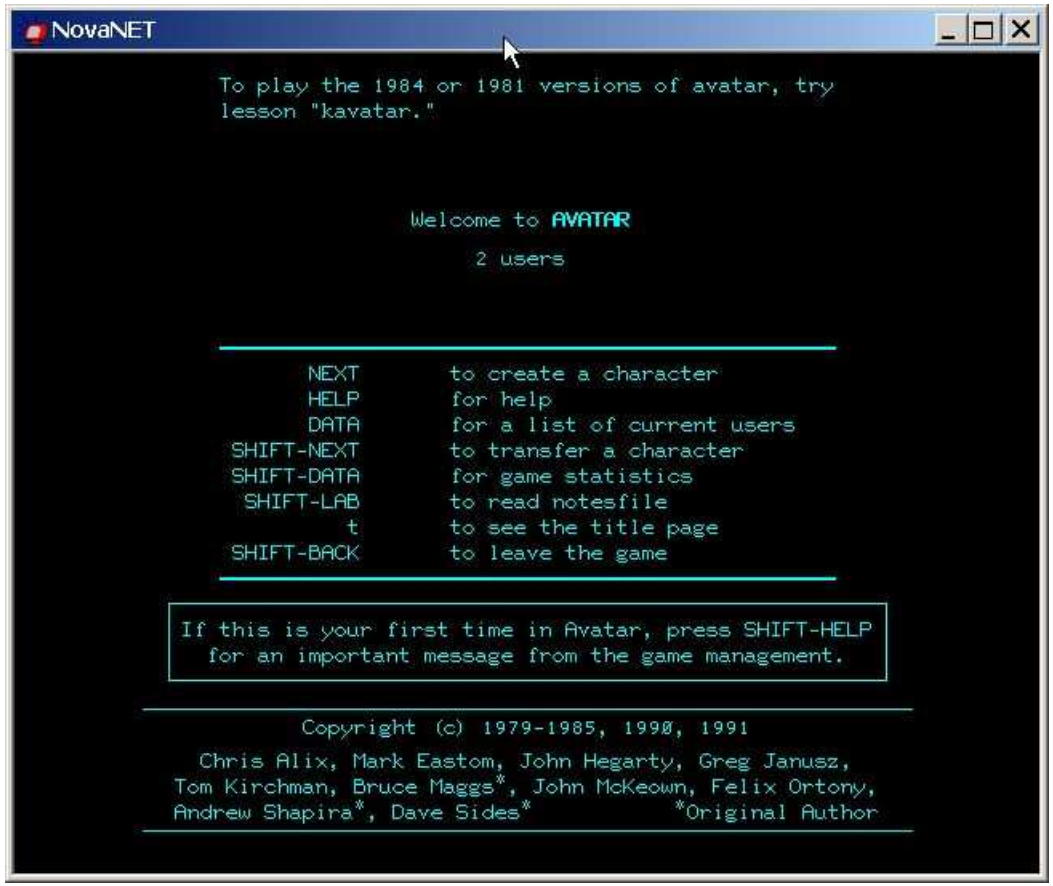
- Dungeons and Dragons
  - orthanc, avatar
- Space
  - empire

Empire

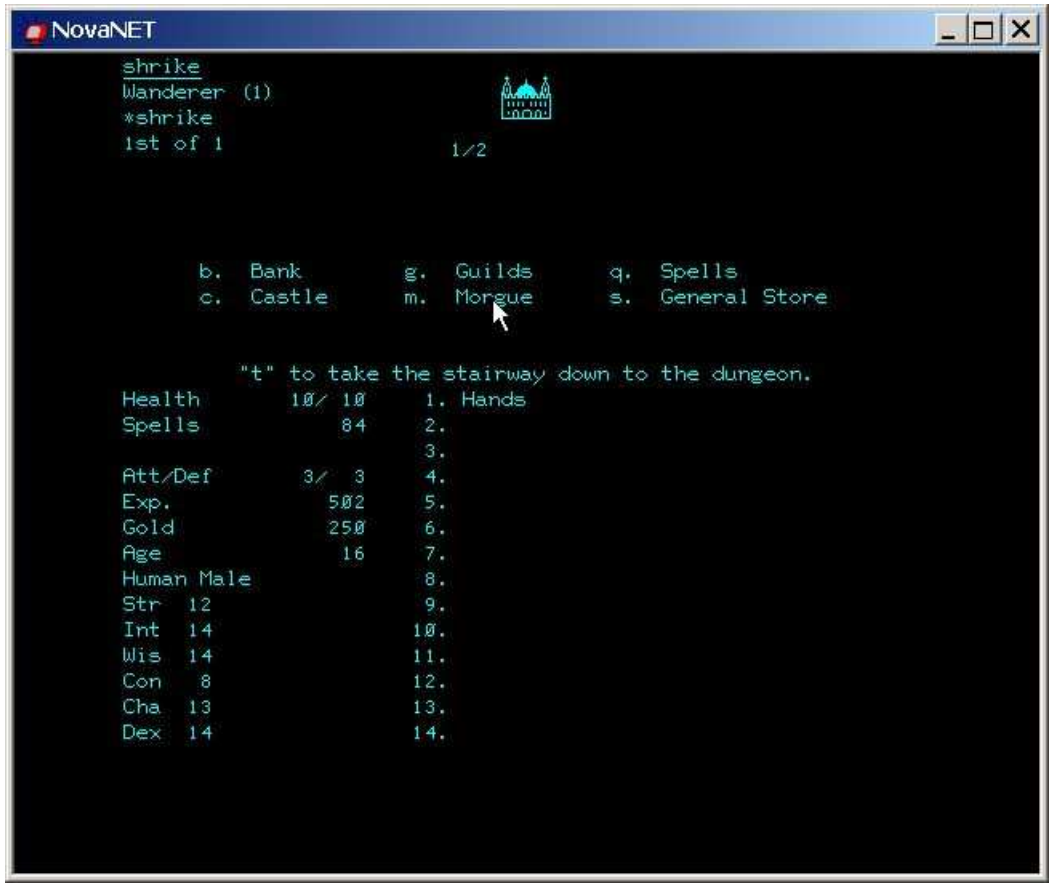

NovaNET
EMPIRE
Total games since 10/08/87 = 166995
Total users since 10/08/87 = 112478
Average # users per day = 18
Number of people now in Empire (including you): 1
Players Total Wins / Monthly
◆Romulans 0 400 0
✧Klingons 1 83 0
✱Federation 0 101 0
▫Orion 0 308 1
Universe Conquered 09/30/04 at 16.52.22.
By: jeff / iatech For: Orion
Enter Your Pseudonym⇒ bruce
Copyright © 1977, 1978 -- by Charles Miller & Gary Fritz

Empire

Avatar


NovaNET
To play the 1984 or 1981 versions of avatar, try
lesson "kavatar."
Welcome to AVATAR
2 users
NEXT to create a character
HELP for help
DATA for a list of current users
SHIFT-NEXT to transfer a character
SHIFT-DATA for game statistics
SHIFT-LAB to read notesfile
t to see the title page
SHIFT-BACK to leave the game
If this is your first time in Avatar, press SHIFT-HELP
for an important message from the game management.
Copyright (c) 1979-1985, 1990, 1991
Chris Alix, Mark Eastom, John Hegarty, Greg Janusz,
Tom Kirchman, Bruce Maggs*, John McKeown, Felix Ortony,
Andrew Shapira*, Dave Sides* *Original Author

Avatar


NovaNET
shrike
Wanderer (1)
*shrike
1st of 1
1/2
b. Bank
c. Castle
g. Guilds
m. Morgue
q. Spells
s. General Store
"t" to take the stairway down to the dungeon.
Health 10/ 10
Spells 84
Att/Def 3/ 3
Exp. 502
Gold 250
Age 16
Human Male
Str 12
Int 14
Wis 14
Con 8
Cha 13
Dex 14
1. Hands
2.
3.
4.
5.
6.
7.
8.
9.
10.
11.
12.
13.
14.