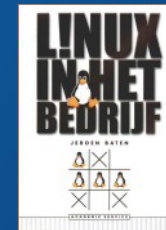


# Running your own mainframe on Linux (for fun and profit)



# Who am I?

- Jeroen Baten
- Lifetime innovator
- Job title : IT Solutionist
- Author of 8 books
- Dad of 5 girls



# Who am I ? (in pics)



# My main project



- LibrePlan
- Web-based project management appl.
- Very cool!

## LIBREPLAN

OpenWebPlanning

The screenshot displays the LibrePlan web application interface. The top navigation bar includes tabs for 'Scheduling', 'Resources', 'Administration / Management', 'Reports', and 'My account'. The main content area is titled 'LibrePlan customization' and shows a 'WBS (tasks)' table. The table has columns for 'Scheduling state', 'Code', 'Name', 'Hours', 'Must start after', and 'Deadline'. The tasks listed are:

Scheduling state	Code	Name	Hours	Must start after	Deadline
C		Project Coordination	200		
C		Graphical design	140		
C		Initial Drafts	60		
C		Static prototypes	40		10/12/11
C		Brand deliverables	20		
C		HTML/CSS templates	80		
C		Feature A implementation	70		
C		Feature B implementation	150		
C		Subfeature B.1	40		
C		Subfeature B.2	110		
C		Add functional Testing	60		
C		Quality Assurance	20		

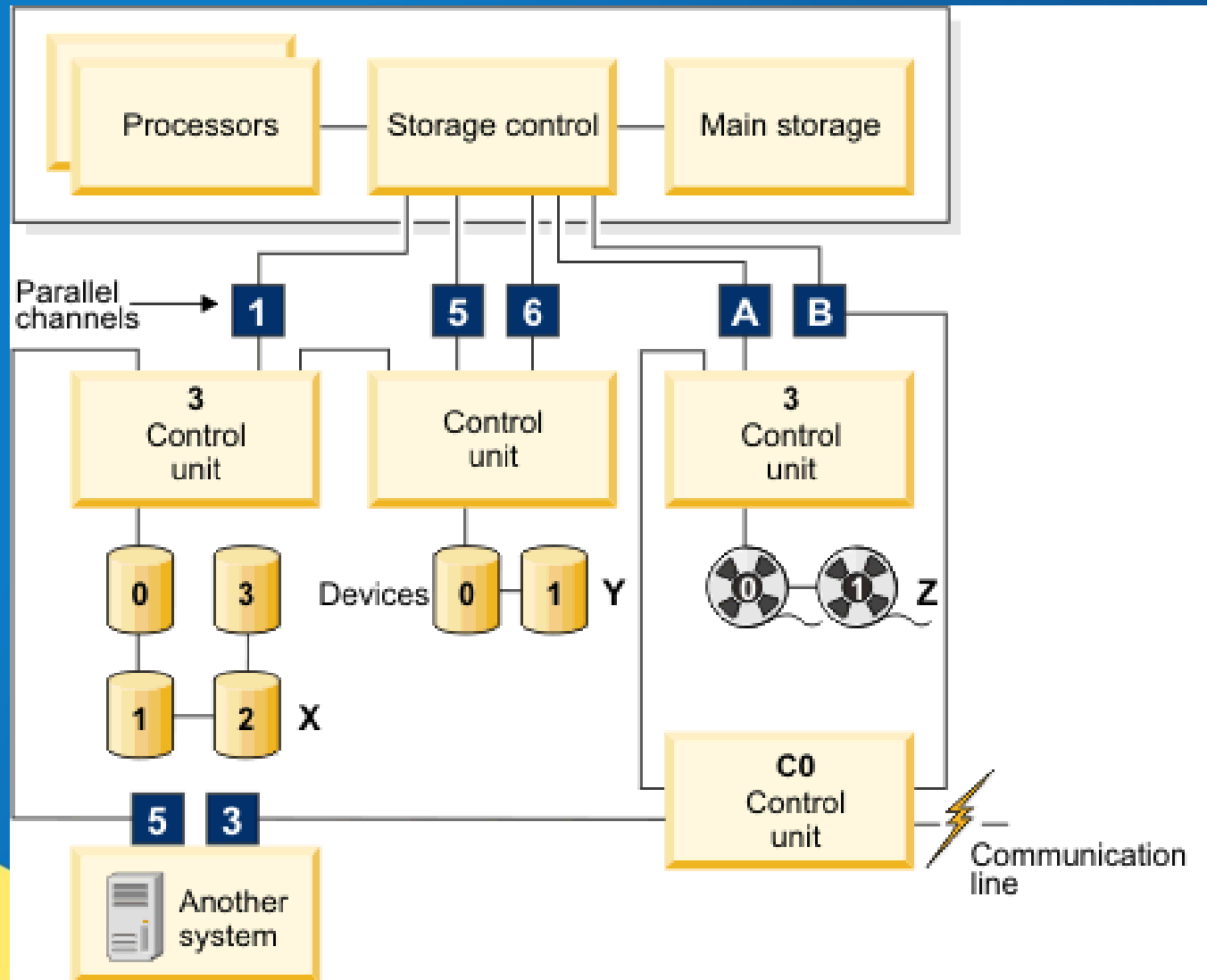
# Let me start with apologies first...



Talking the same language... can still cause a culture clash.  
With respect to the code of conduct:  
Please forgive me where applicable.  
(Trick: Dutch people take everything literally!)

ANGLO-DUTCH TRANSLATION GUIDE		
WHAT THE BRITISH SAY	WHAT THE BRITISH MEAN	WHAT THE DUTCH UNDERSTAND
<i>With all due respect ...</i>	<i>I think you are wrong.</i>	<i>He is listening to me.</i>
<i>Perhaps you would think about ... I would suggest ...</i>	<i>This is an order. Do it or be prepared to justify yourself.</i>	<i>Think about this idea and do it if you like.</i>
<i>Oh, by the way ...</i>	<i>The following criticism of the purpose of the discussion is ...</i>	<i>This is not very important.</i>
<i>I was a bit disappointed that ...</i>	<i>I am very upset and angry that ...</i>	<i>It doesn't really matter.</i>
<i>Very interesting ...</i>	<i>I don't like it.</i>	<i>They are impressed.</i>
<i>Could you consider some other options?</i>	<i>Your idea is not a good one.</i>	<i>They have not yet decided.</i>
<i>Please think about that some more.</i>	<i>It's a bad idea. Don't do it.</i>	<i>It's a good idea. Keep developing it.</i>
<i>I'm sure it's my fault.</i>	<i>It's not my fault.</i>	<i>It was their fault.</i>
<i>That is an original point of view.</i>	<i>Your idea is stupid.</i>	<i>They like my ideas!</i>

# What is a mainframe?



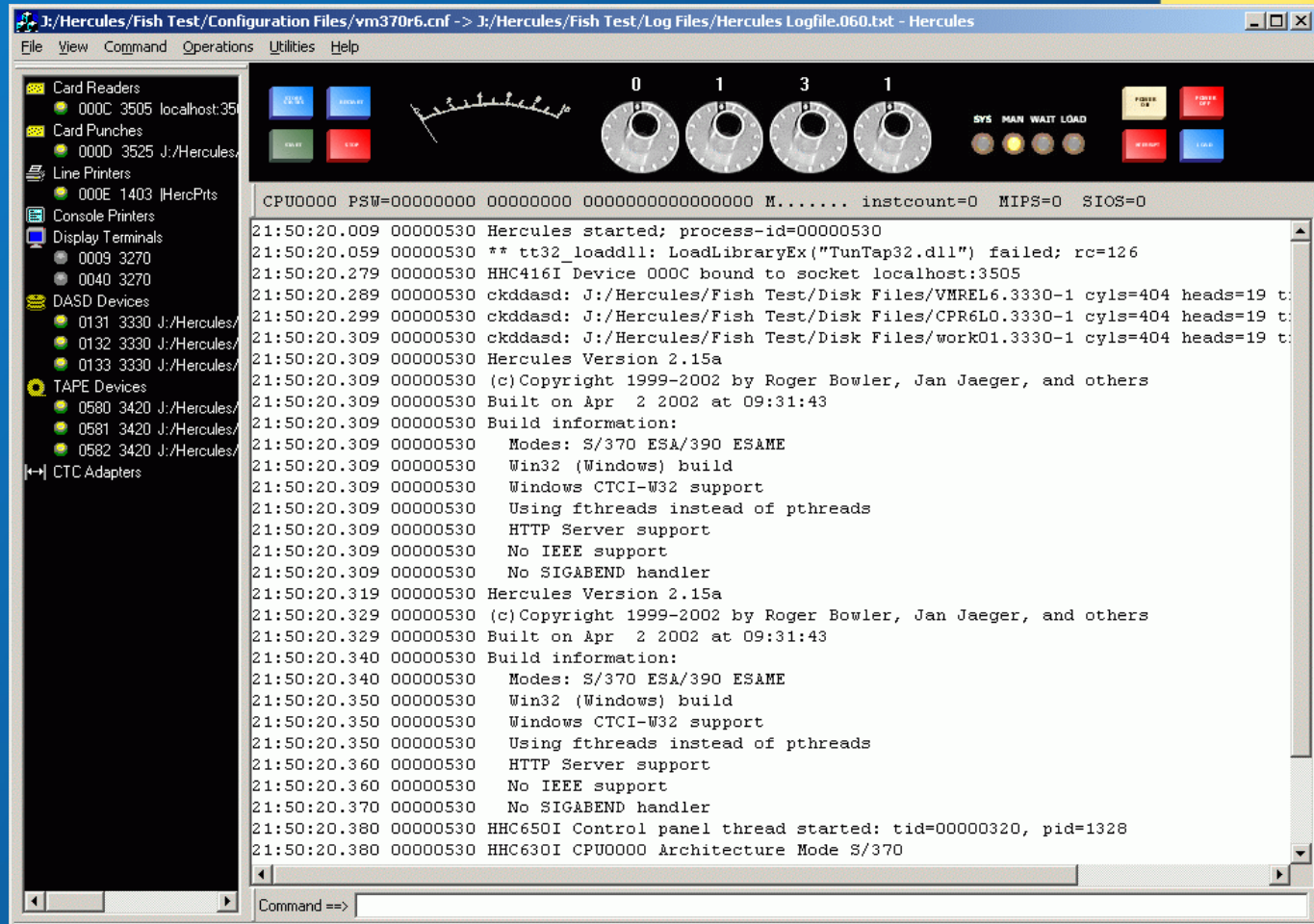
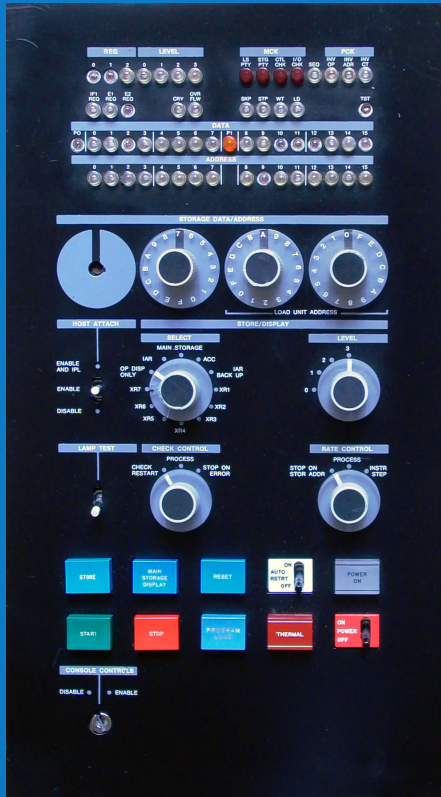
Mainframe=  
Massive  
hardware  
parallelisation

# What is “Hercules”



- A IBM Mainframe emulator for:
  - System/370
  - ESA/390
  - 64-bit z/Architecture.
- Hercules runs under Linux, Windows, Solaris, FreeBSD, and Mac OS X

# How does it look?







# What does it do?

- Run software (duh!)
- Many OS in public domain available
  - If you have a license **and the hardware**: OS/390, z/OS, VSE/ESA, z/VSE, VM/ESA, z/VM, TPF/ESA, z/TPF
  - Otherwise: OS/360, DOS/360, DOS/VS, **MVS**, VM/370, TSS/370, **Linux :-)**

# What **not** to do....



- Google “hercules project”
  - [www.hercules-390.org](http://www.hercules-390.org)
    - “Last updated \$Date: 2010-03-09”
- Follow site to:
  - <http://www.ibiblio.org/jmaynard/>
- Easy start: Volker's MVS 3.8J turnkey system version 3
- Jay Maynard, at [jmaynard@conmicro.cx](mailto:jmaynard@conmicro.cx)
- Lights are on but nobody’s home!
- A long time I thought he was deceased but then I found this:  
<https://gitlab.com/esr/upside/wikis/People>

# You decide what to think



Then, on May 1<sup>st</sup>, 2018:

“I ate'nt dead.”

and

“I may not be involved in Hercules any more, but I haven't gone anywhere.”

# What to do!



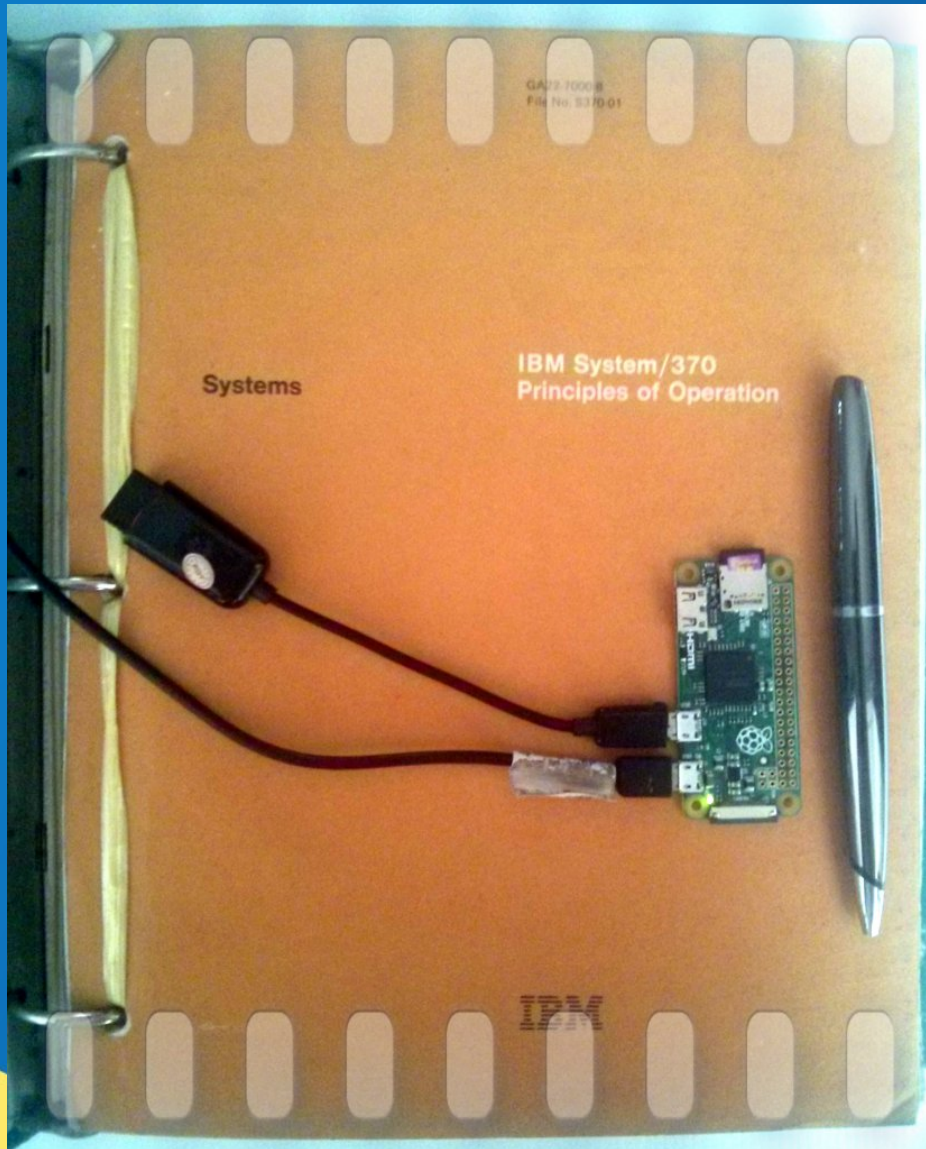
- Main site: <http://www.hercules-390.eu>
- Main list: [hercules-390@yahoogroups.com](mailto:hercules-390@yahoogroups.com) (7K members?)
- Easy start: MVS 3.8j Tur(n)key 4- System
  - <http://wotho.ethz.ch/tk4-/>
  - Download: [http://wotho.ethz.ch/tk4-/tk4-\\_v1.00\\_current.zip](http://wotho.ethz.ch/tk4-/tk4-_v1.00_current.zip)
  - Last update: [http://wotho.ethz.ch/tk4-/tk4-\\_v1.00\\_update\\_08.zip](http://wotho.ethz.ch/tk4-/tk4-_v1.00_update_08.zip)
- Start learning: <https://www.youtube.com/user/moshe5760/videos>
- Moshix has 25 60+ YouTube video howtos!
- Youtube: kumar ITChannel: 20 tutorial videos



# What you need

- PC with Linux (or Windows, I know)
- Or Raspberry Pi
- 3270 terminal emulator (tn3270)
- Hercules software
- Some Operating System distribution

# Very small mainframe



<https://www.suhendro.com/2016/10/look-ma-my-5-pi-zero-thinks-it-is-a-mainframe/>

# Lingo to understand



- DASD: Direct Attached Storage Device (harddisk)
- TSO: Time Sharing Option (multi-user)
- JES2: Job Entry System (job queue)
- CICS: front-end to transactional software
- Datasets: created assigned space for stuff
- Catalog: system list of available stuff





# What it look like (menu)



x3270-4 127.0.0.1:3270

File Options

Terminal CUU0C0 Date 23.07.18  
System TK4- Time 09:41:37  
TSO User HERC01  
RFE ENDED WITH RC=0  
Option ==> █

The MVS 3.8j Tur(n)key System  
TK4- Version 1.00 Update 08 -- MVS PUT 8505

**TSO Applications**

1	RFE	"SPF like" productivity tool
2	RPF	"SPF like" productivity tool
3	IM	IMON/370 system monitor
4	QUEUE	spool browser
5	HELP	general TSO help
6	UTILS	information on utilities and commands available
7	TERMTEST	verify 3270 terminal capabilities

Enter X to Terminate

PF3=Terminate

x3270 Keypad

PF1	PF2	PF3
PF4	PF5	PF6
PF7	PF8	PF9
PF10	PF11	PF12
↑		
←	↶	→
⌂	↓	↷
PA1	PA2	PA3
←		→
Clear	Reset	
Erase EOF	Erase Input	
Dup	Field Mark	
Sys Req	Cursor Select	
Attn	Compose	
↵	Enter	

005/014

# Demo time!



# Hercules performance?

Comparing an i7 processor to a real IBM Z14



```
System TK4- 2018-07-09 21:02:18.88 Line 1 of 91 13%
MISLEADING INDICATORS OF PERFORMANCE SAMPLING (MIPS)
TEST 1-RR(F): 344,471,236 INSTRUCTIONS PER SECOND
TEST 2-RR(S): 242,954,324 INSTRUCTIONS PER SECOND
TEST 3-RX(F): 133,315,557 INSTRUCTIONS PER SECOND
TEST 4-RX(S): 66,706,690 INSTRUCTIONS PER SECOND
TEST 5-SS(F): 17,783,468 INSTRUCTIONS PER SECOND
TEST 6-SS(S): 4,890,429 INSTRUCTIONS PER SECOND
TEST 7-FP(E): NOT PERFORMED
TEST 8-FP(D): NOT PERFORMED
TEST RESULTS FOR CPUID=000006113033/SYSID=TK4-/RR-TEST-COEF=1/ADJC= 60951
```

X 16,877,907,008

```
System SYS1 2018-07-09 21:03:14.33 Line 1 of 103 82%
MISLEADING INDICATORS OF PERFORMANCE SAMPLING (MIPS)
TEST T1 RR(F-32): 5,813,953,488 INSTRUCTIONS PER SECOND
TEST T2 RR(S-32): 766,871,165 INSTRUCTIONS PER SECOND
TEST T3 RX(FAST): 5,434,782,608 INSTRUCTIONS PER SECOND
TEST T4 RX(SLOW): 403,063,280 INSTRUCTIONS PER SECOND
TEST T5 SS(FAST): 200,682,319 INSTRUCTIONS PER SECOND
TEST T6 SS(SLOW): 40,346,984 INSTRUCTIONS PER SECOND
TEST T7 FP(E-32): NOT PERFORMED
TEST T8 FP(D-64): NOT PERFORMED
TEST T9 RR(F-64): NOT PERFORMED
TEST TA RR(S-64): NOT PERFORMED
TEST RESULTS FOR CPUID=0006D5E62818/SYSID=SYS1/SNAME=ADCD /ADJC= 439

AVERAGE I/O RATE(S) (IO/SEC) SINCE IPL
CP0: 7.29 CP1:
```

# Update apr 2018



- Moshix now has 61 video tutorials
- Moshix made tk4 system available:
  - Send TSO login request to [MOSHEPRT1@GMAIL.COM](mailto:MOSHEPRT1@GMAIL.COM)
- Current S-390 mailgroup age stats:
  - Average age: 62.6, standard deviation 12.4

# Playing with hardware

Suppose I want to hookup a real terminal to Hercules?



# Or just the experience...

## The GitHub cool-retro-term ( <https://github.com/Swordfish90/cool-retro-term> ) project



```
swordfish@swordfish-rMBP: ~/workspaces/qt5/cool-retro-term
File Edit View Profiles Help

swordfish-rMBP :: ~ >
swordfish-rMBP :: ~ > cd workspaces/qt5
swordfish-rMBP :: qt5/cool-retro-term %
app                               gpl-3.0.txt
cool-retro-term.desktop           packaging
cool-retro-term.pro               qmltermwidget
cool-retro-term.pro.user         README.md
gpl-2.0.txt
swordfish-rMBP :: qt5/cool-retro-term %

AUTHORS  lib.pri           README.md
COPYING  packaging       src
lib      qmltermwidget.pro test-app
swordfish-rMBP :: qt5/cool-retro-term %
```

```
man gcc
File Edit View Profiles Help

[-foption...] [-mmachine-option...]
[-o outfile] [@file] infile...

Only the most useful options are listed
here; see below for the remainder. g++
accepts mostly the same options as gcc.

DESCRIPTION
When you invoke GCC, it normally does
preprocessing, compilation, assembly an
d
linking. The "overall options" allow
you to stop this process at an
E(1) line 14 (press h for help or q to quit)
```

# My new friends



- During the preparation of this talk I made a few new friends:
  - A lot of guys in the S-390 mailgroup
  - Moshe Bar of the Moshix youtube channel
  - Sam Golob (maintainer of the CBT tape)
- In short: a wonderful new world!
- For Fun and Profit!

Thank you for your attention



Questions for me?: [jeroen@jeroenbaten.nl](mailto:jeroen@jeroenbaten.nl)