

# Binary unit prefixes

Caio Costa

UERJ / CERN

For the CERN School of Computing, 2019

# Introduction

- Units are important
- That is why we have standards

# Introduction

- Units are important
- That is why we have standards

But...

# Introduction

“The nice thing about standards is that you have so many to choose from.”

Andrew S. Tanenbaum

# Disaster!

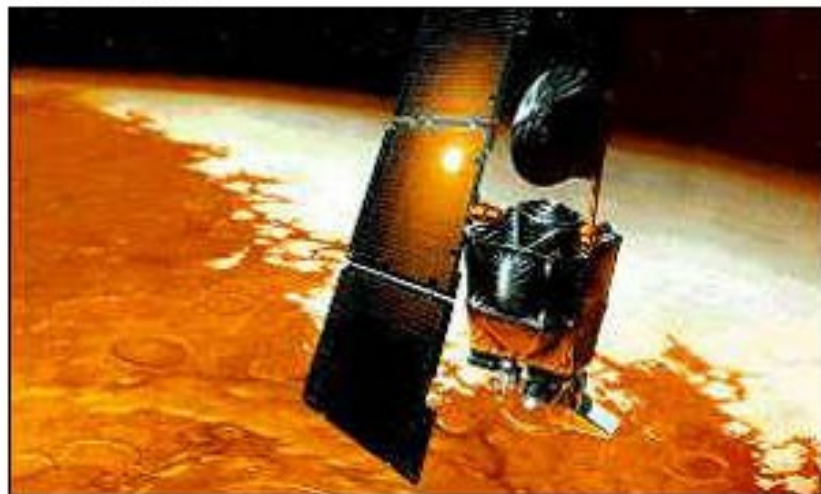
**BBC NEWS**

News in Audio News in Video Newyddion Hobb

Thursday, September 30, 1999 Published at 18:53 GMT 19:53 UK

Sci/Tech

## Confusion leads to Mars failure

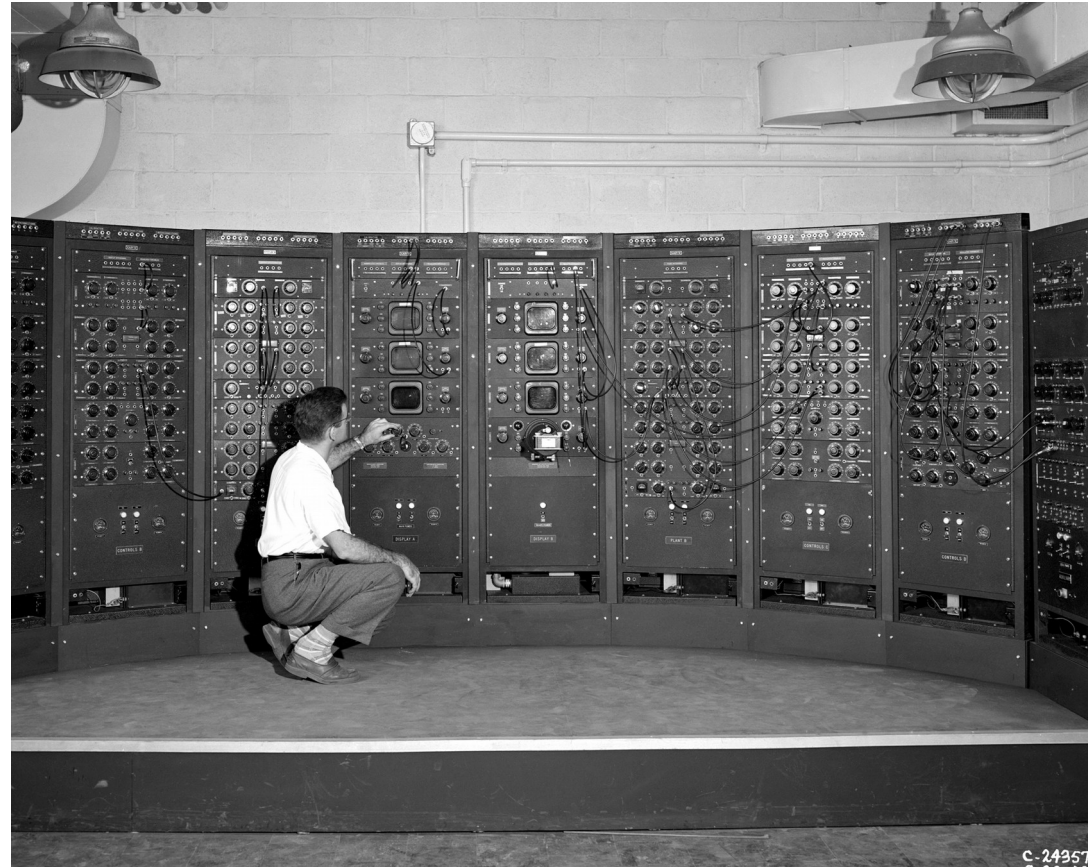


The Mars Climate Orbiter: Now in pieces on the planet's surface

The Mars Climate Orbiter Spacecraft was lost because one Nasa team used imperial units while another used metric units for a key spacecraft operation.

# In the beginning...

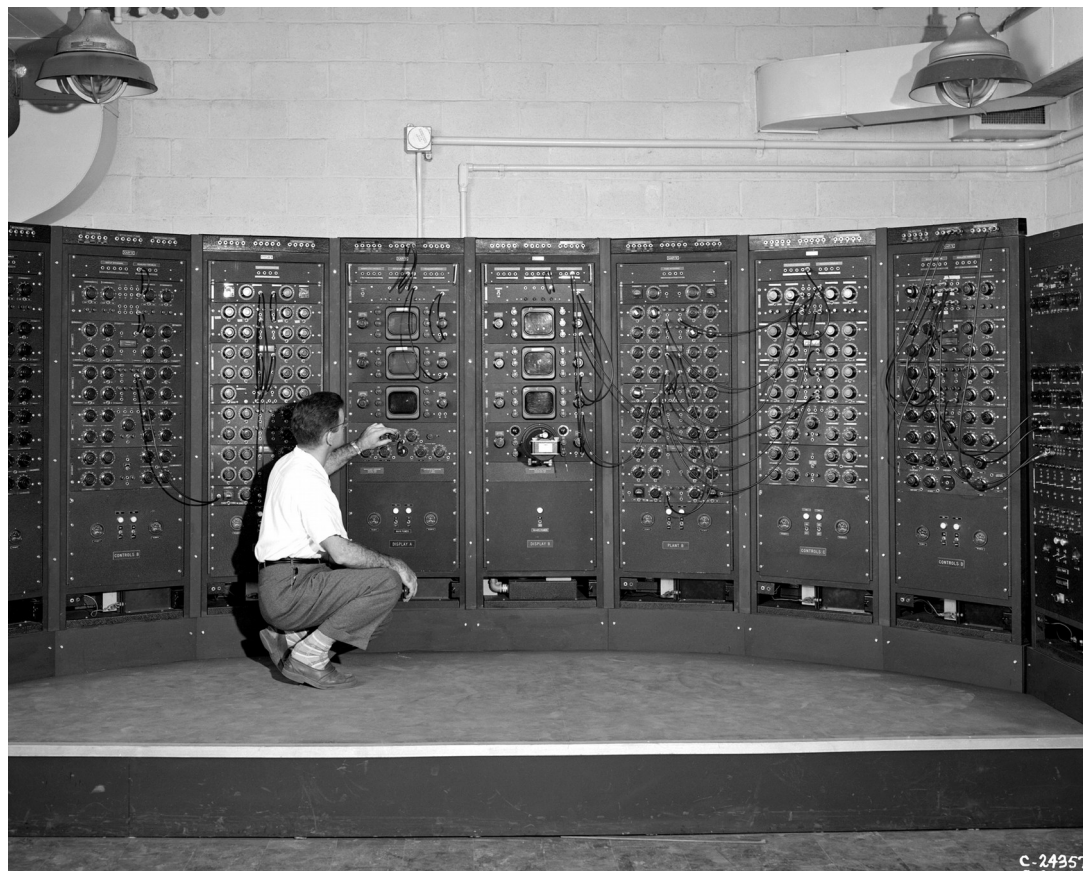
- Small volume of data
- Kilobytes was natural
- Binary structures
- 1000 vs 1024



# In the beginning...

















- Small volume of data
- Kilobytes was natural
- Binary structures
- 1000 vs 1024
- 1 kilobyte = 1024 bytes?!

Image: NASA



# As magnitudes increase...

Source: Wikipedia

Prefix	Binary ÷ Decimal		Decimal ÷ Binary	
kilo	1.024 (+2.4%)		0.9766 (-2.3%)	
mega	1.049 (+4.9%)		0.9537 (-4.6%)	
giga	1.074 (+7.4%)		0.9313 (-6.9%)	
tera	1.100 (+10.0%)		0.9095 (-9.1%)	
peta	1.126 (+12.6%)		0.8882 (-11.2%)	
exa	1.153 (+15.3%)		0.8674 (-13.3%)	
zetta	1.181 (+18.1%)		0.8470 (-15.3%)	
yotta	1.209 (+20.9%)		0.8272 (-17.3%)	

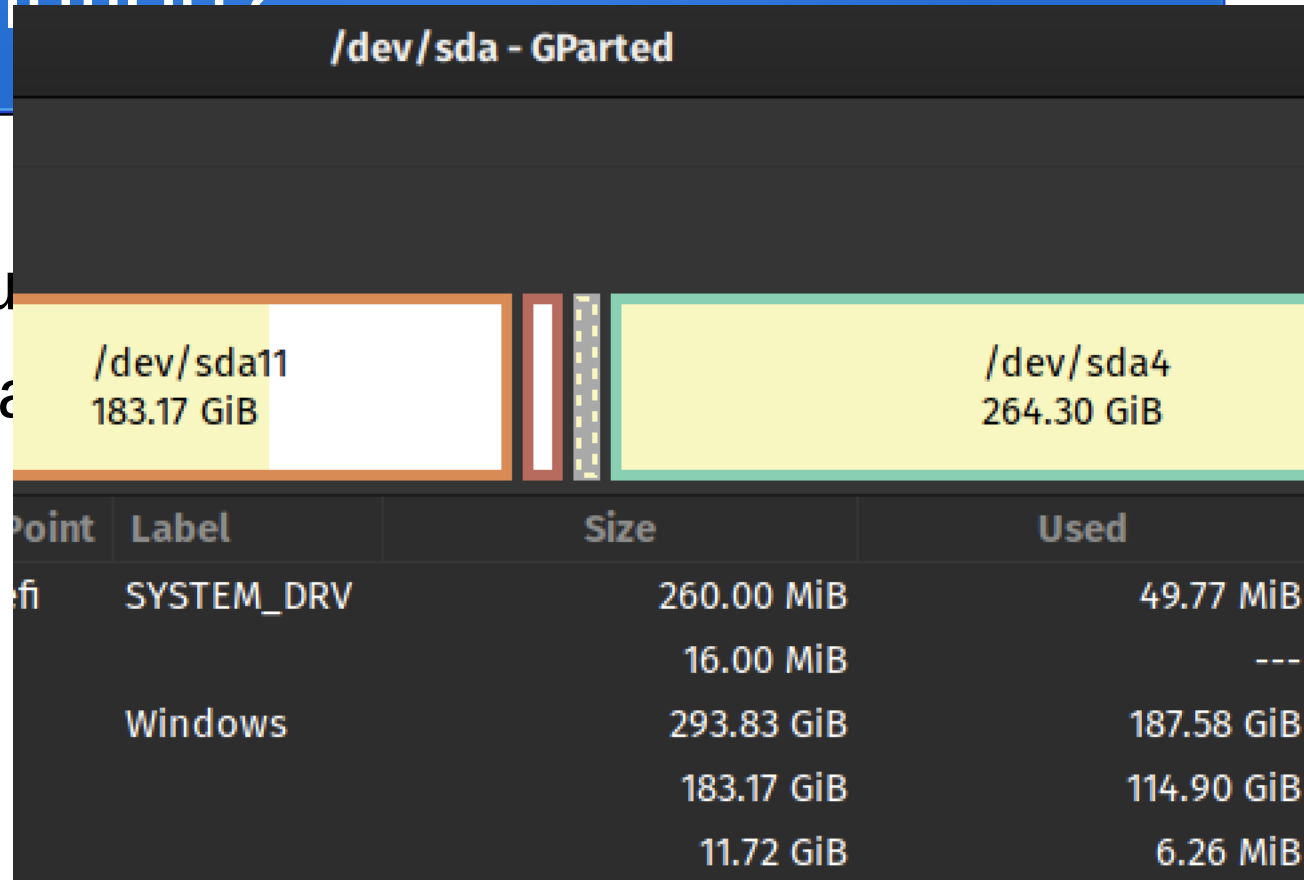


# The solution?

- Binary prefixes to the rescue!
- Introduced in 1998 by the IEC
- You may have seen them already

# The solution?

- Binary
- Introdu
- You ma



# The prefixes

Kilobyte → kibibyte

Megabyte → mebibyte

Terabyte → tebibyte

Petabyte → pebibyte

...



Thank you!