SIMPLE = T / Conforms to FITS standard

COMMENT The (still fit)

COMMENT FITS format

COMMENT and the curse

COMMENT of organic growth

OBSERVER = 'Michal Ciesla' / Author
ORIGIN = 'Faculty of Mathematics and Physics, &
CONTINUE Charles University, Prague, Czechia' / Org
DATE = '2025-06-08T09:30:00.000' / [ISO] Talk date
LONGSTRN = 'OGIP 1.0' / Uses Long Strings

COMMENT ^-- Slide 1

HISTORY Agenda

HISTORY FITS Basics
HISTORY Efficient Design
HISTORY The BINTABLE Extension
HISTORY Where It All Goes Downhill
HISTORY The Curse of Organic Growth
HISTORY Designing for Sustainability
HISTORY Conclusion
NAXIS = 0 / Number of data axes

COMMENT ^-- Slide 2

HISTORY FITS Basics

For any scientific
data sets

Flexible
Image
Transport
System

Multi-dimensional
data cubes

Data compression

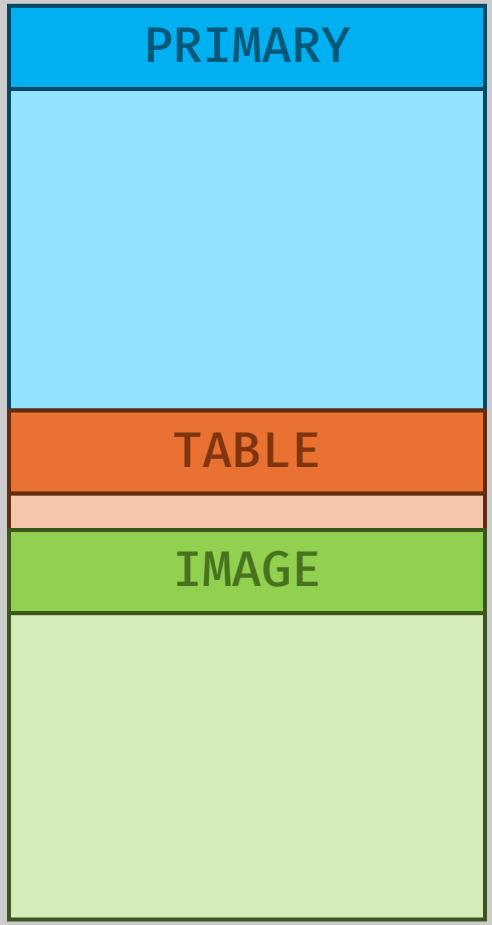
COMMENT ^-- Slide 3

HISTORY FITS Basics

Text header
Binary data

One or more HDUs

3 table “types”



Header
Data
Unit

COMMENT ^-- Slide 4

HISTORY Efficient Design

Consists of 2880-byte blocks

↳ Originally developed for magnetic tape storage

but bigger

Header in fixed 80-byte lines

↳ Width of standard terminal

Header easily accessible

COMMENT ^-- Slide 5

HISTORY The BINTABLE Extension

IMAGE

k-D matrix
(same type)

TABLE

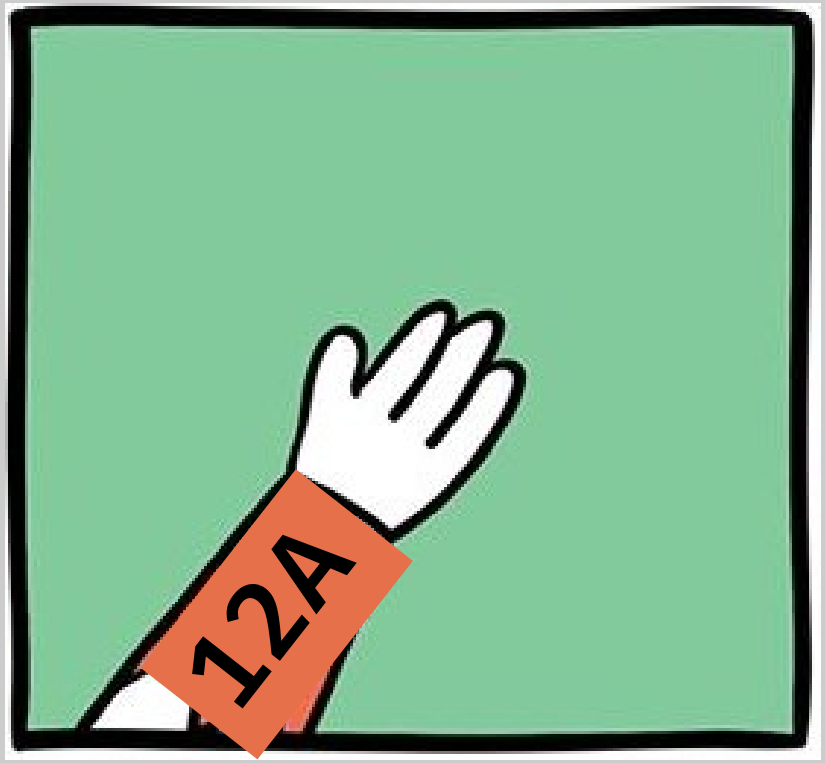
2D multi-column
FORTRAN types

BINTABLE

2D multi-column
arbitrary types
nesting

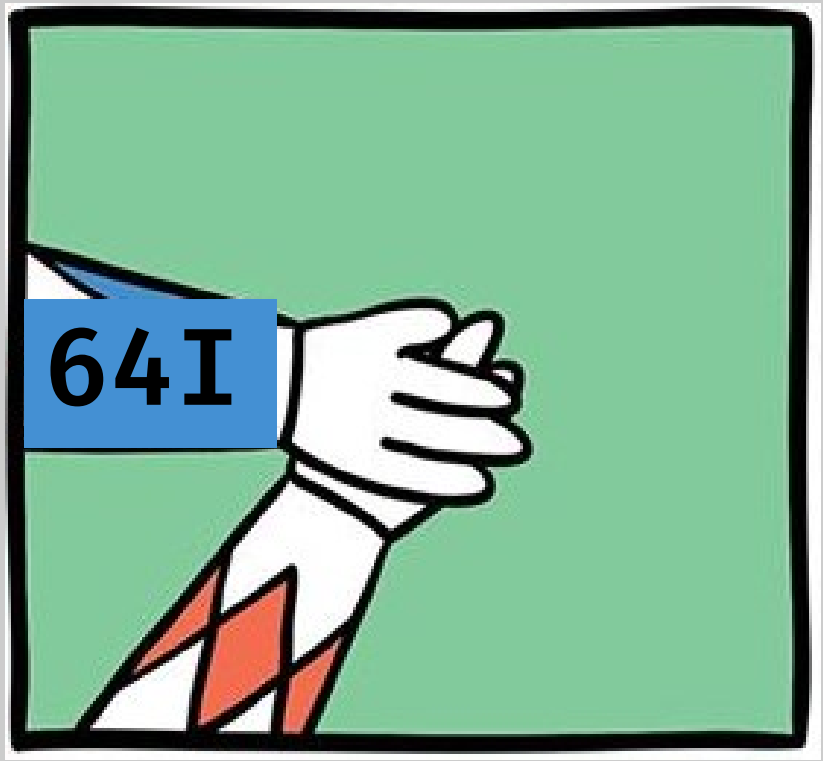
COMMENT ^-- Slide 6

HISTORY The BINTABLE Extension



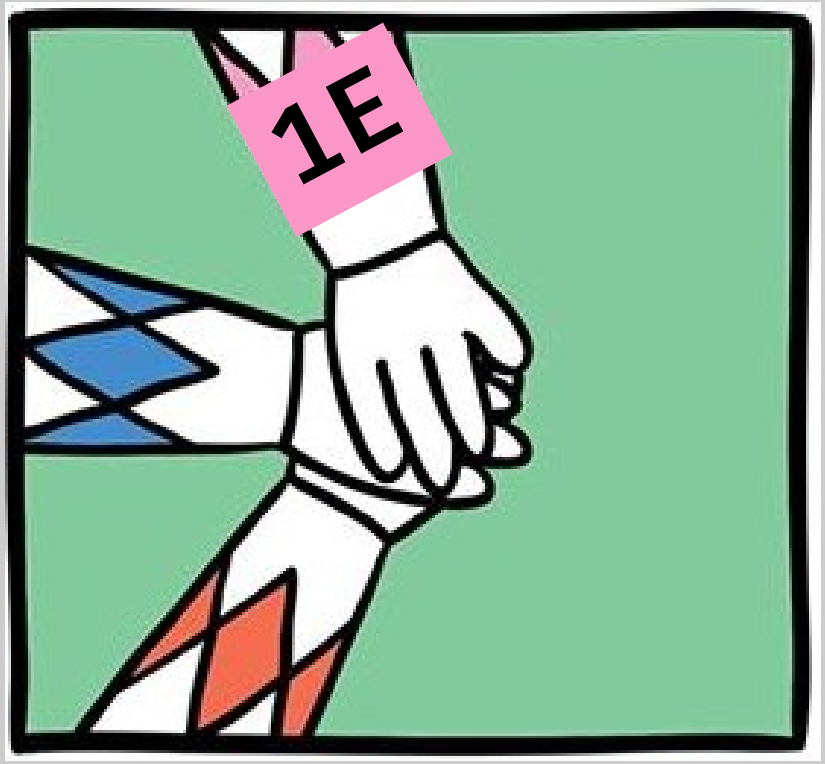
COMMENT ^-- Slide 7

HISTORY The BINTABLE Extension



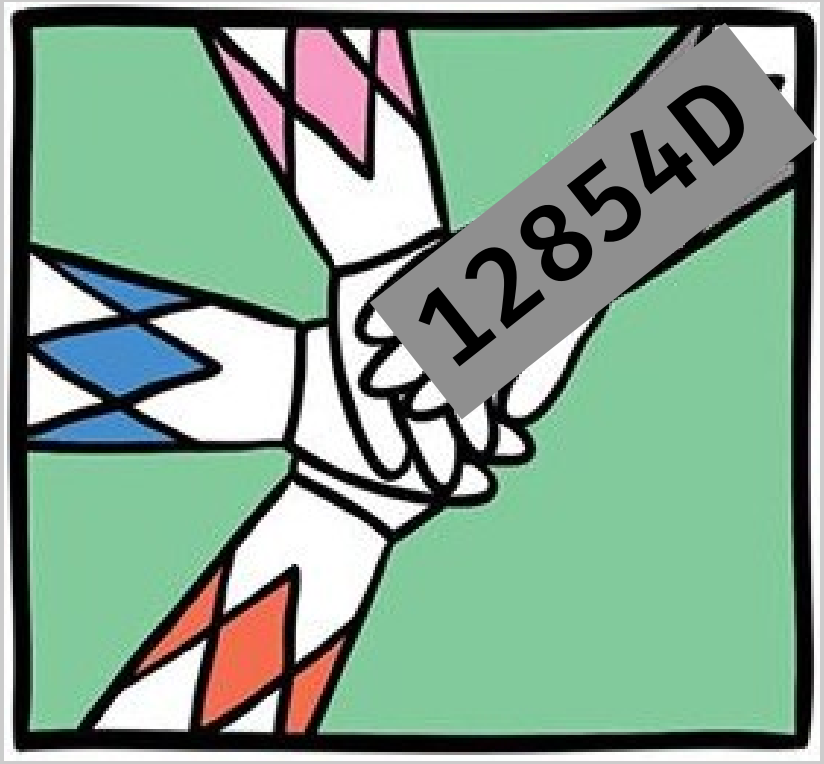
COMMENT ^-- Slide 7

HISTORY The BINTABLE Extension



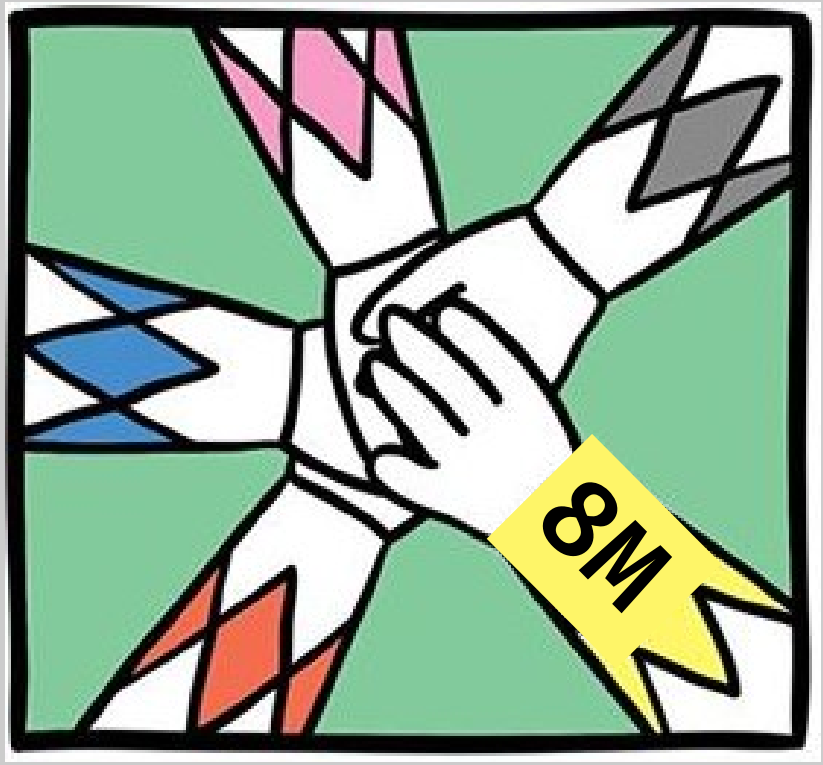
COMMENT ^-- Slide 7

HISTORY The BINTABLE Extension



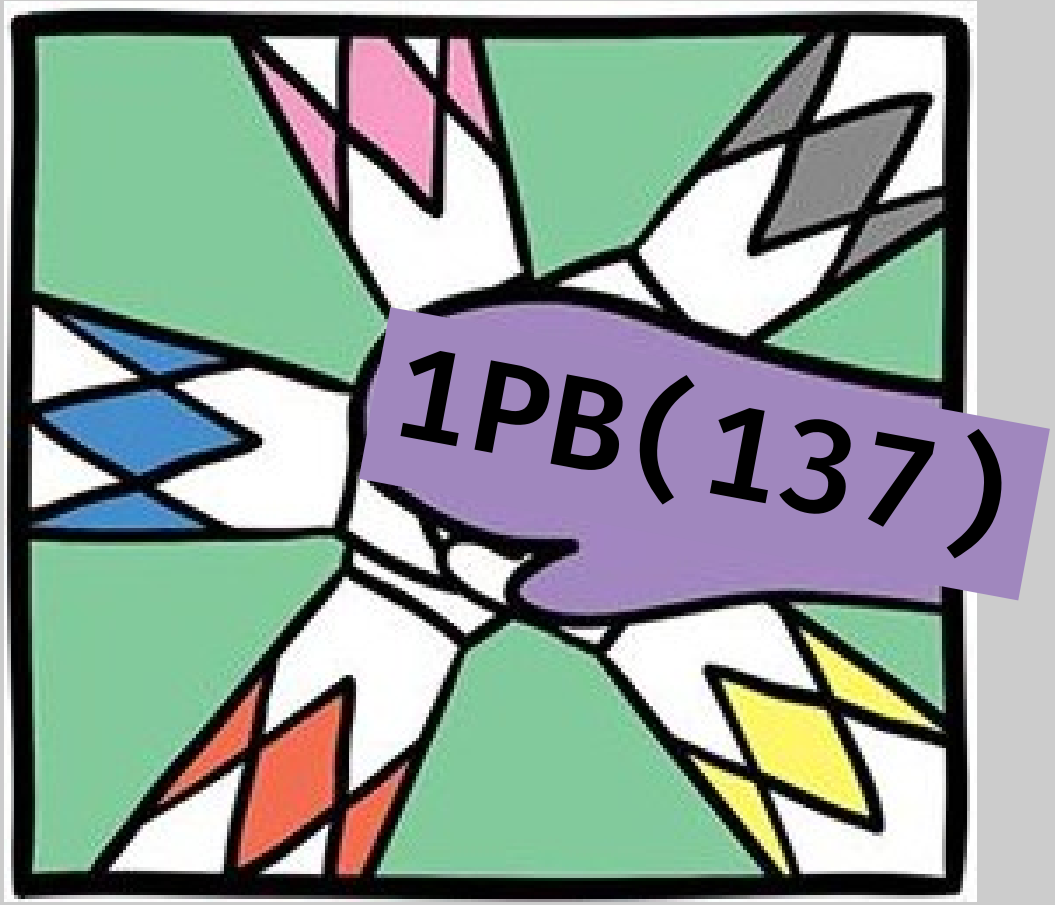
COMMENT ^-- Slide 7

HISTORY The BINTABLE Extension



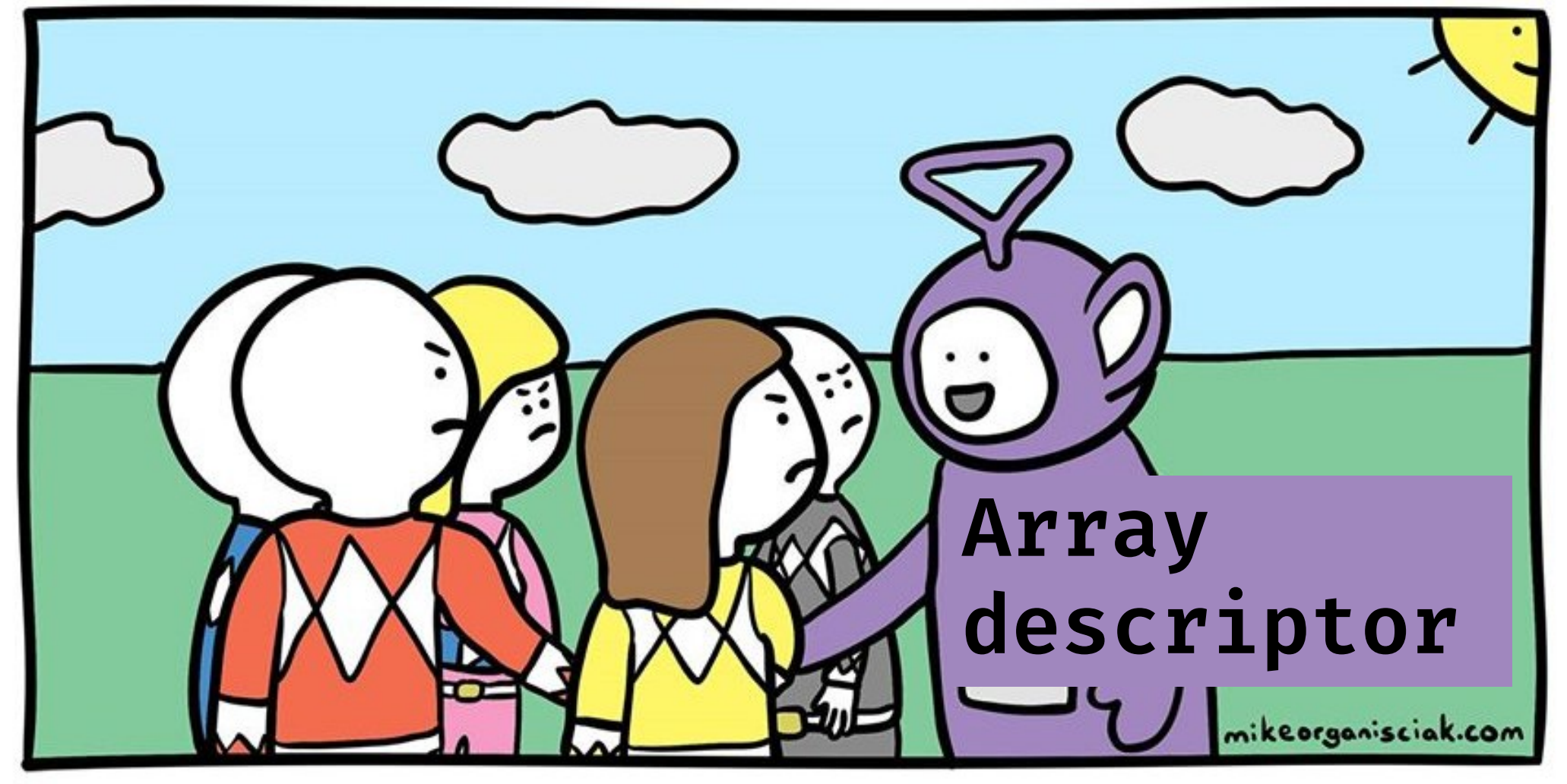
COMMENT ^-- Slide 7

HISTORY The BINTABLE Extension



COMMENT ^-- Slide 7

HISTORY The BINTABLE Extension



COMMENT ^-- Slide 7

HISTORY Where It All Goes Downhill

Column-oriented FITS???

COMMENT ^-- Slide 8

HISTORY Where It All Goes Downhill

Normal

Column-oriented

COMMENT ^-- Slide 9

HISTORY Where It All Goes Downhill

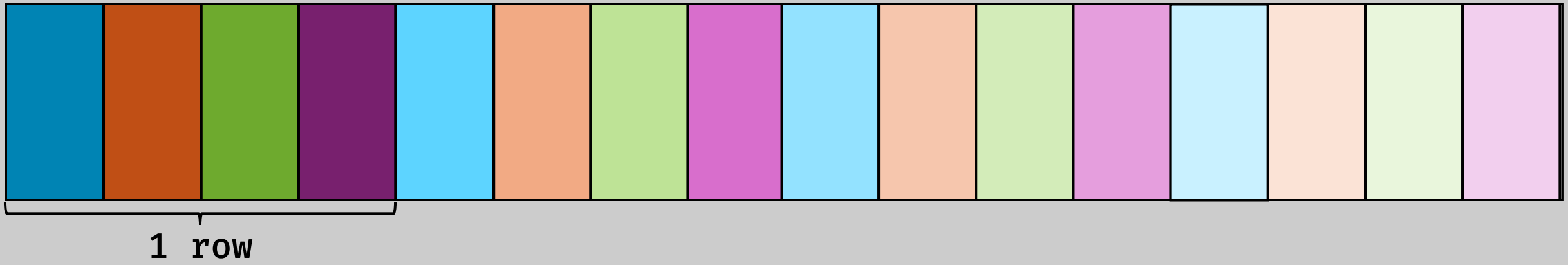
Normal

Column-oriented

COMMENT ^-- Slide 9

HISTORY Where It All Goes Downhill

Normal

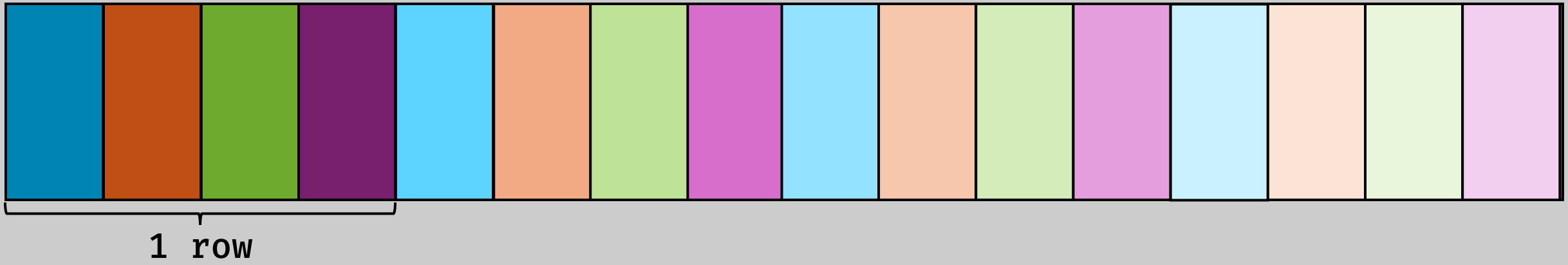


Column-oriented

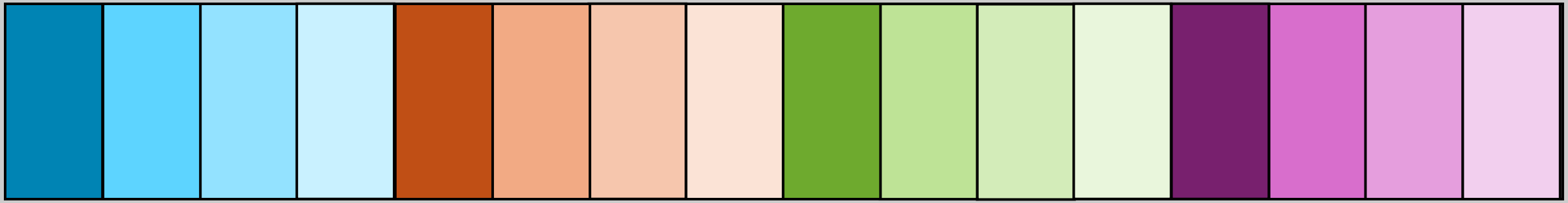
COMMENT ^-- Slide 9

HISTORY Where It All Goes Downhill

Normal



Column-oriented



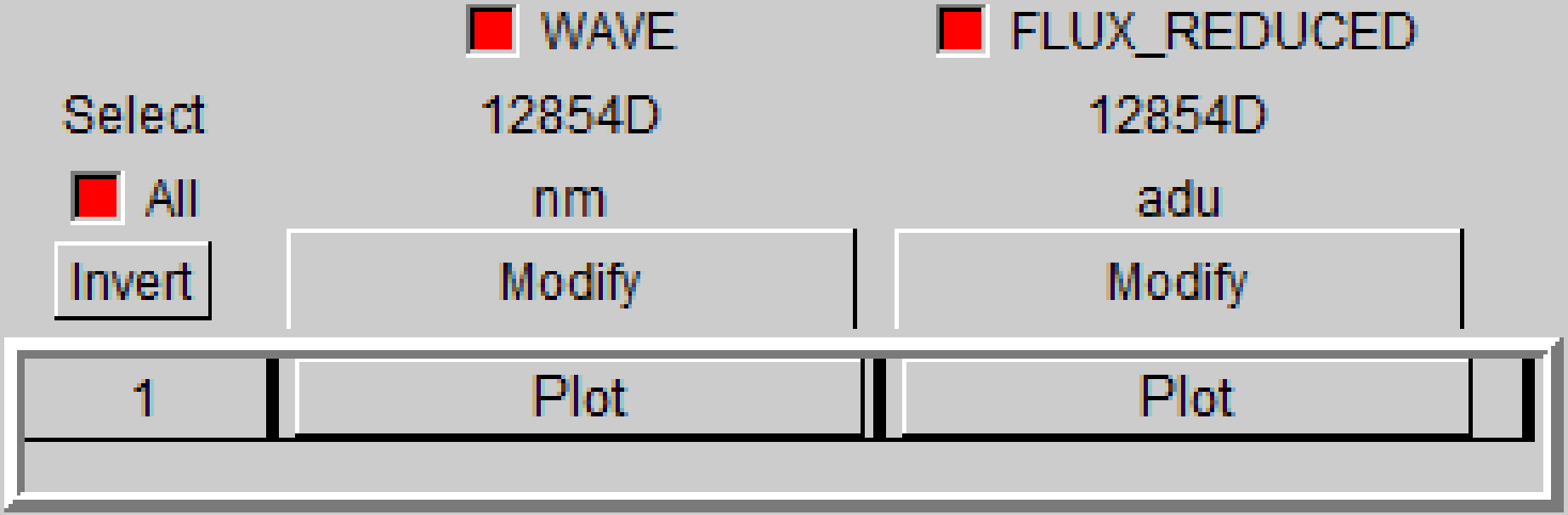
COMMENT ^-- Slide 9

HISTORY Where It All Goes Downhill

Index	Extension	Type	Dimension	View
0	Primary	Image	0	Header Image Table
1	SPECTRUM	Binary	7 cols X 1 rows	Header Hist Plot All Select

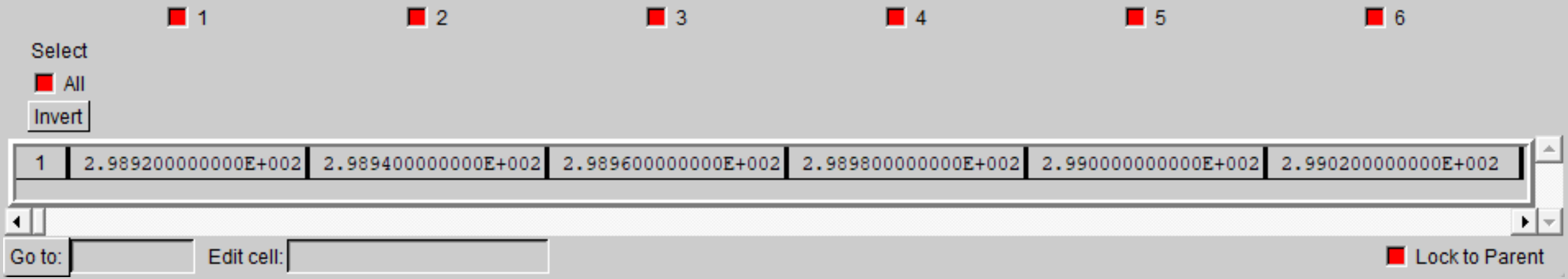
COMMENT ^-- Slide 10

HISTORY Where It All Goes Downhill



COMMENT ^-- Slide 10

HISTORY Where It All Goes Downhill



COMMENT ^-- Slide 10

HISTORY Where It All Goes Downhill

Array Descriptor???

COMMENT ^-- Slide 11

HISTORY Where It All Goes Downhill

↱
Actually
excellent
but poorly
documented

Used for compressed data

rPt(e_{max})

r: 0, 1, or absent

t: data type

e_{max} ≥ max no. of elements

COMMENT ^-- Slide 12

HISTORY Where It All Goes Downhill

↱
Actually
excellent
but poorly
documented

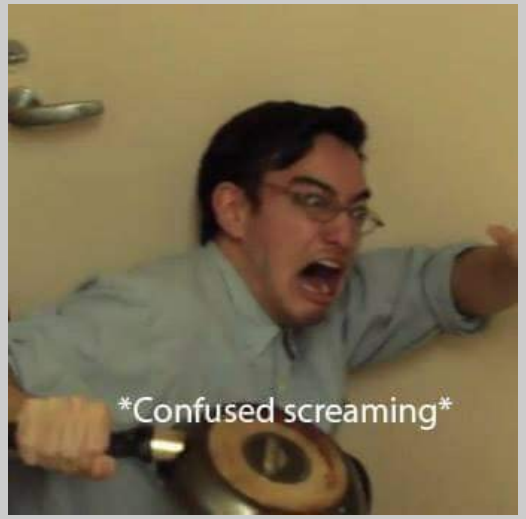
Used for compressed data

rPt(e_{max})

r: 0, 1, or absent

t: data type

e_{max} ≥ max no. of elements



COMMENT ^-- Slide 12

HISTORY The Curse of Organic Growth

What happens when
requirements keep
coming up on the go

It turns into what we call
“spaghetti code”

COMMENT ^-- Slide 13

HISTORY Designing for Sustainability

Your code will
not be used
just once

Treat it like a
library for your
future self

But foresight
takes practice

COMMENT ^-- Slide 14

HISTORY Conclusion

Still fit?

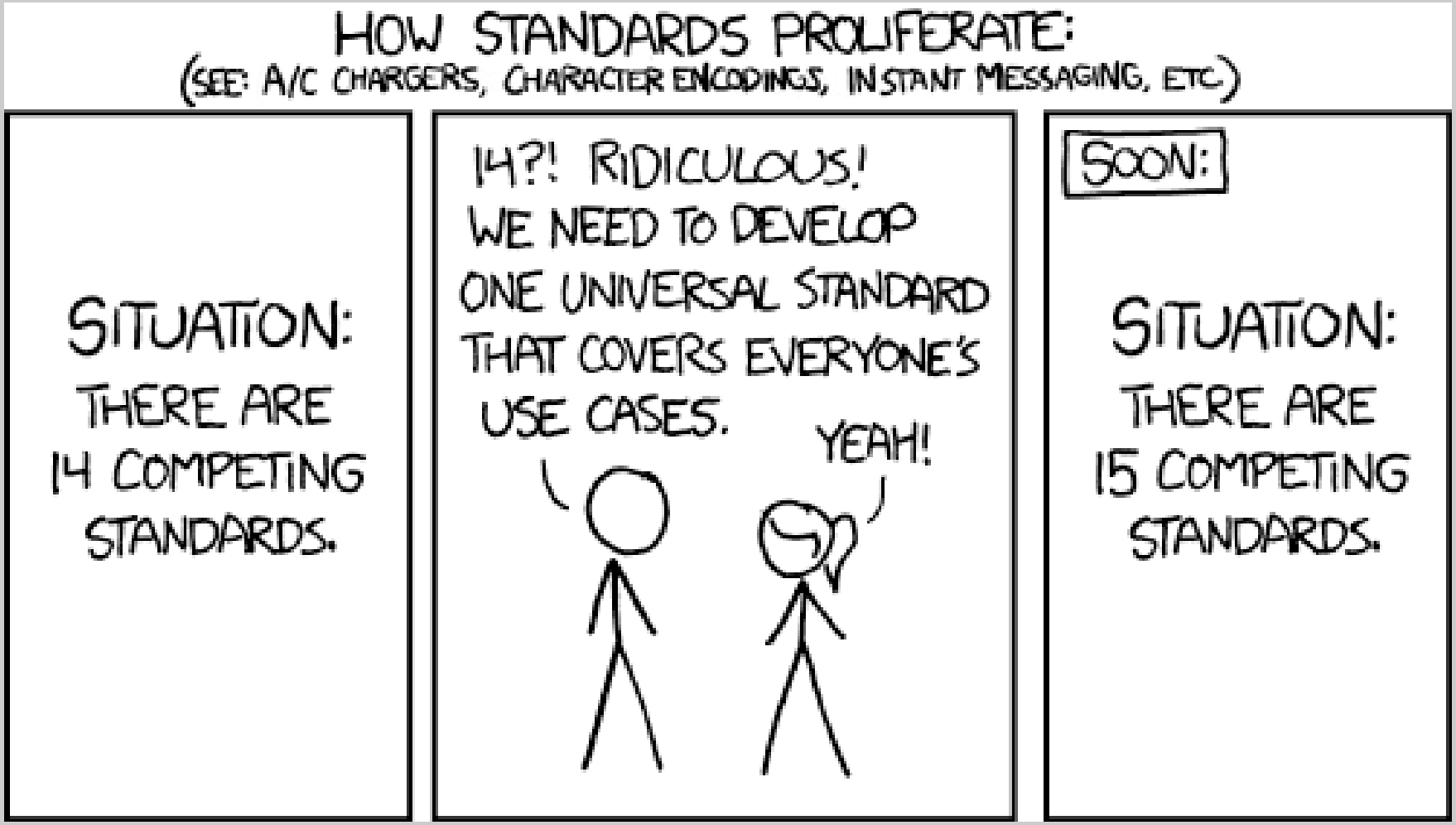
YES

Could be better?

Absolutely, but…

COMMENT ^-- Slide 15

HISTORY Conclusion



COMMENT ^-- Slide 16

HISTORY Conclusion

Brilliantly universal

Efficient access to (meta)data

Lesson in computer engineering

Organic growth vs. foresight

COMMENT ^-- Slide 17

Michal Ciesla

mciesla.cz
hello@mciesla.cz
@mciesla@mstdn.social

Sources:

The FITS Support Office. fits.gsfc.nasa.gov

FITS Working Group. Definition of the Flexible Image Transport System (FITS) Version 3.0. 2010.

Images:

Slide 7: Mike Organisciak, Facebook

Slide 10: Screenshots from fv

Slide 12: George Kusunoki Miller, YouTube

Slide 16: Randall Munroe, xkcd.com

END