

horizon

a new star on the EDA sky

Lukas Kramer

03.02.2018

FOSDEM 2018

Why write an EDA package from scratch in 2016?

Why write an EDA package from scratch in 2016?

- Convenient and collaborative management of symbols, etc. avoiding redundancy
- Proper support for parts
- Unified editor
- Schematic editor that isn't a drawing program
- Rule-driven design
- Explicit references (i.e. not by name / location)
- Make use of OpenGL 3 features
- Playground for experimentation

C++14

~ 50 kLOC

C++14

~ 50 kLOC

C++14

Gtk3 \geq 3.20

~ 50 kLOC

C++14

Gtk3 \geq 3.20

Builds and runs on Linux and Windows

~ 50 kLOC

JSON

C++14

Gtk3 \geq 3.20

Builds and runs on Linux and Windows

499bf624-b2f1-4366-8b9a-0eeb2c8fbb3f \sim 50 kLOC

JSON

C++14

Gtk3 \geq 3.20

Builds and runs on Linux and Windows

UUIDs ~ 50 kLOC

JSON C++14

Gtk3 \geq 3.20

Builds and runs on Linux and Windows

What's wrong with libraries

- Like a file system with only one level of hierarchy
- Not a database

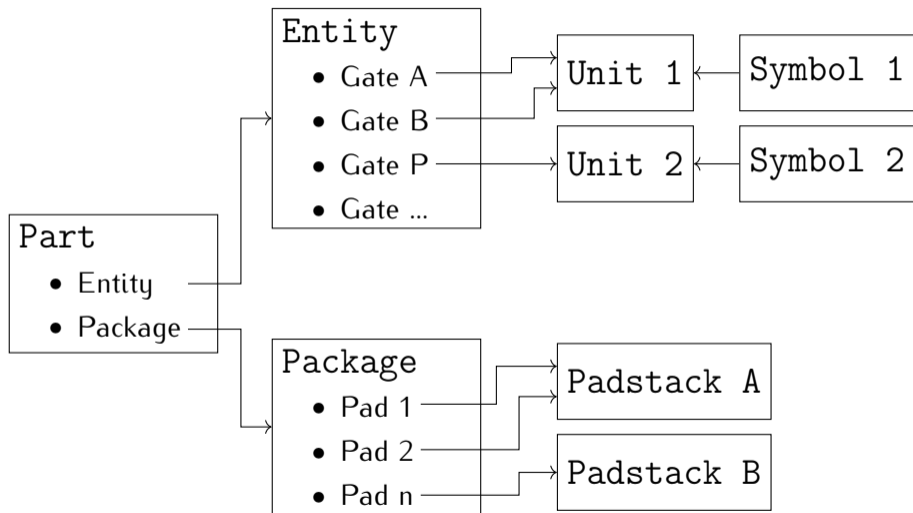
What's wrong with libraries

- Like a file system with only one level of hierarchy
- Not a database

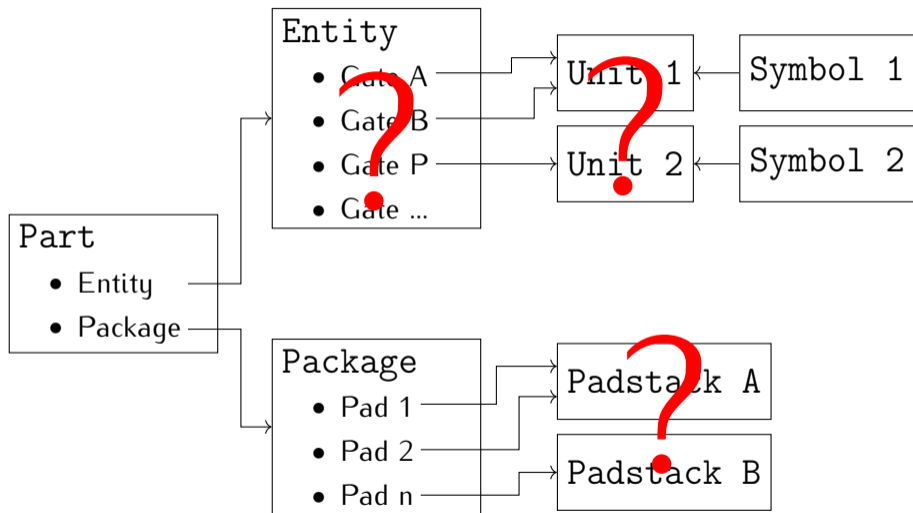
The Pool

- Each item is an individual JSON file
- Metadata is stored in a SQLite database
- Only contains real parts / parts that can be mapped to a real part

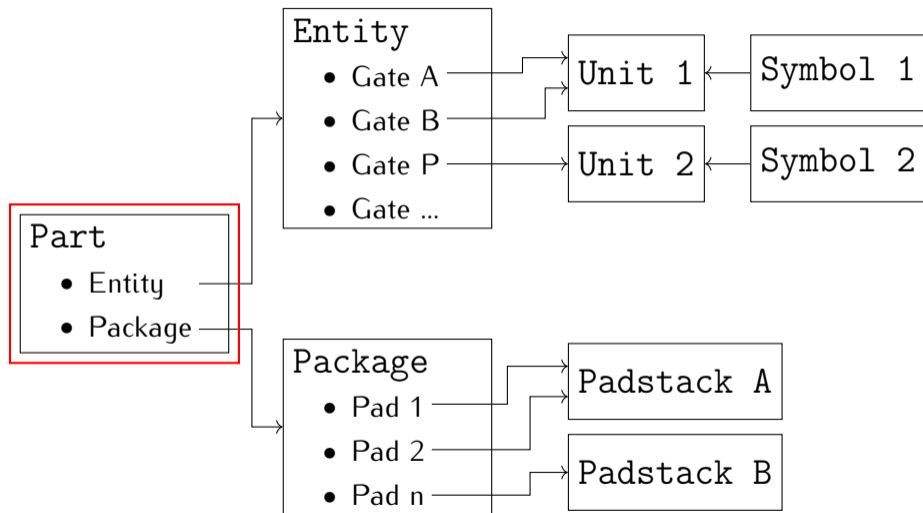
The Pool



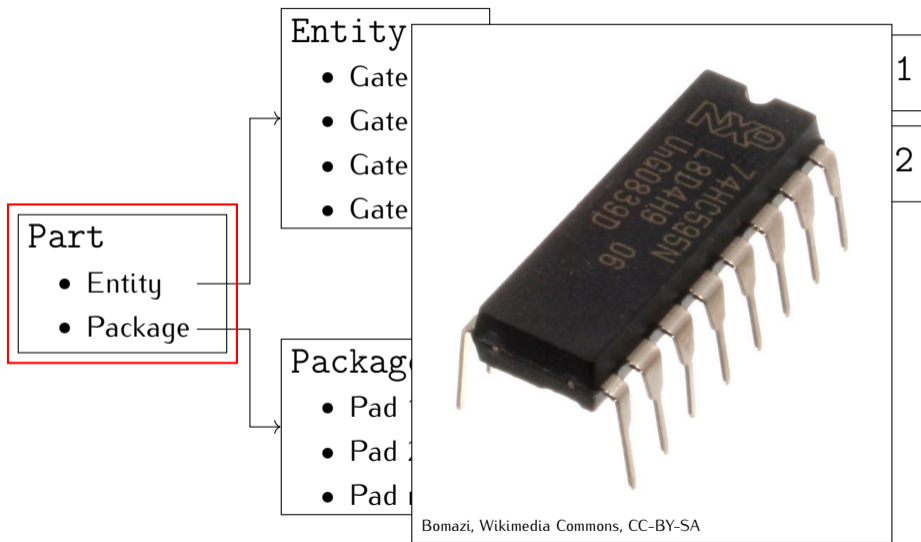
The Pool



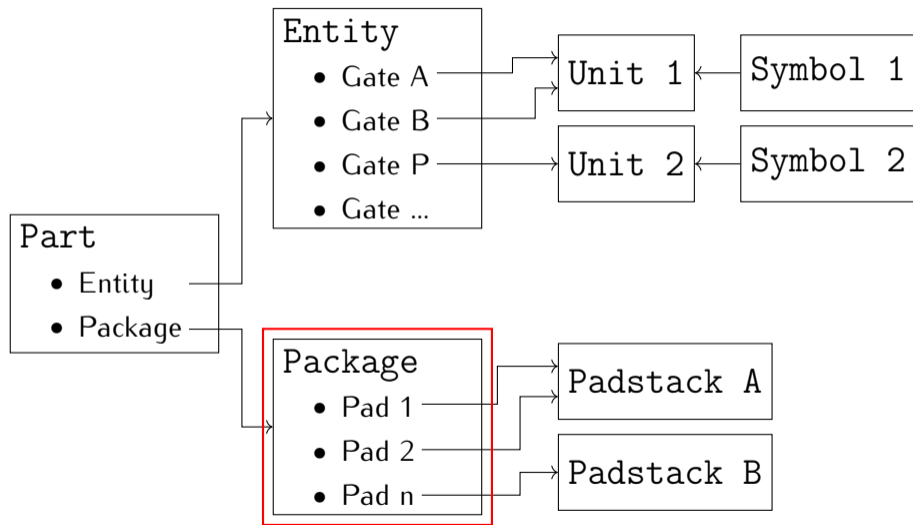
The Pool



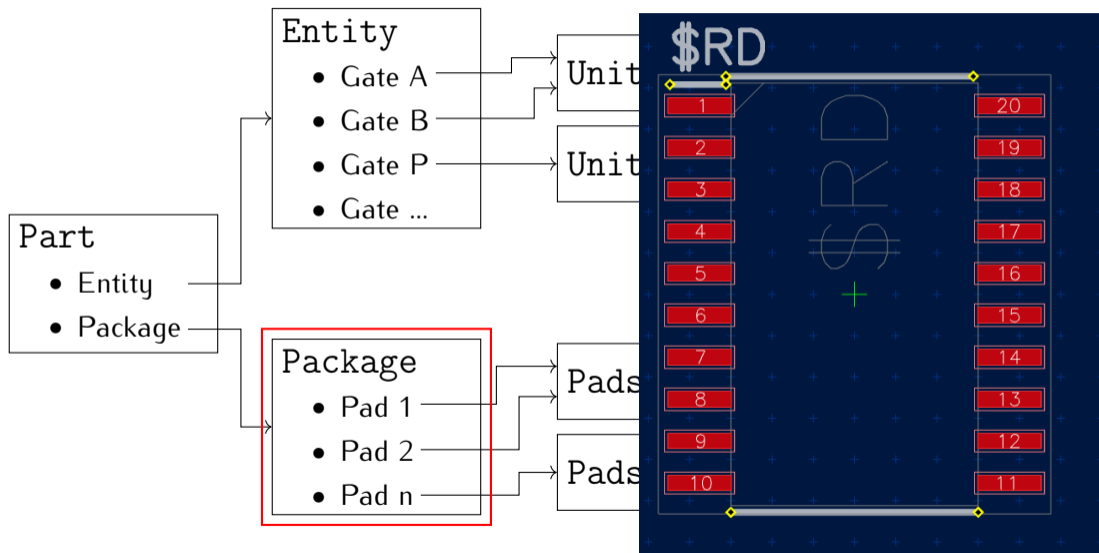
The Pool



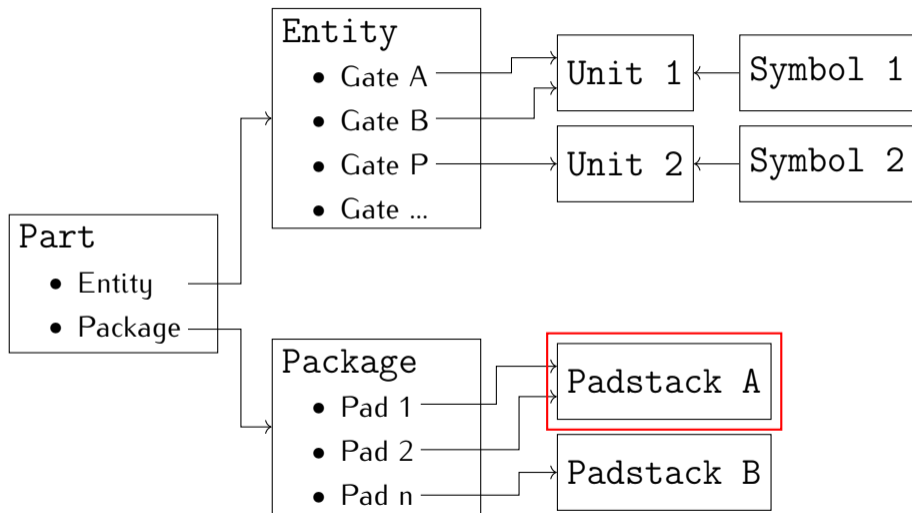
The Pool



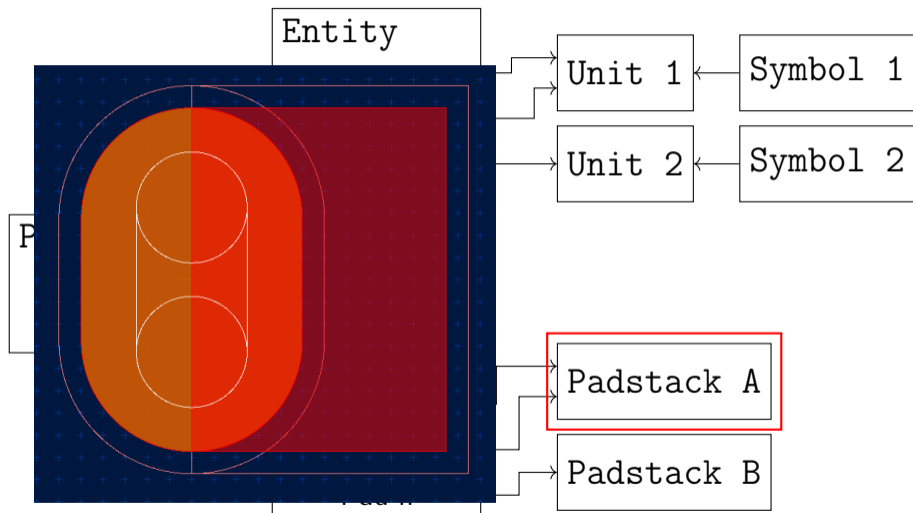
The Pool



The Pool



The Pool



Entity

1.55mm 1.0mm

get-parameter [solder_mask_expansion]

2 *

+xy

set-shape [mask-ob obround]

Symbol 1

Symbol 2

Par

1.15mm

- get-parameter [solder_mask_expansion]

+

- 1.55mm

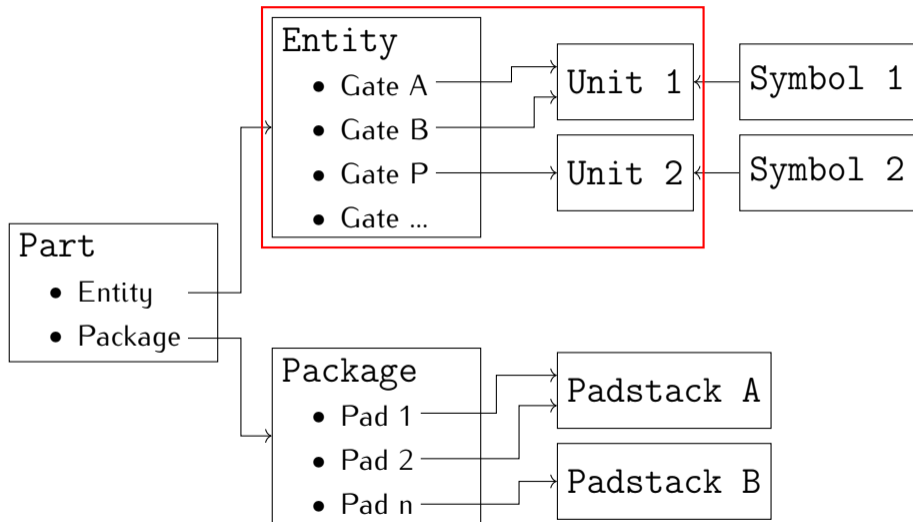
get-parameter [solder_mask_expansion]

2 * +

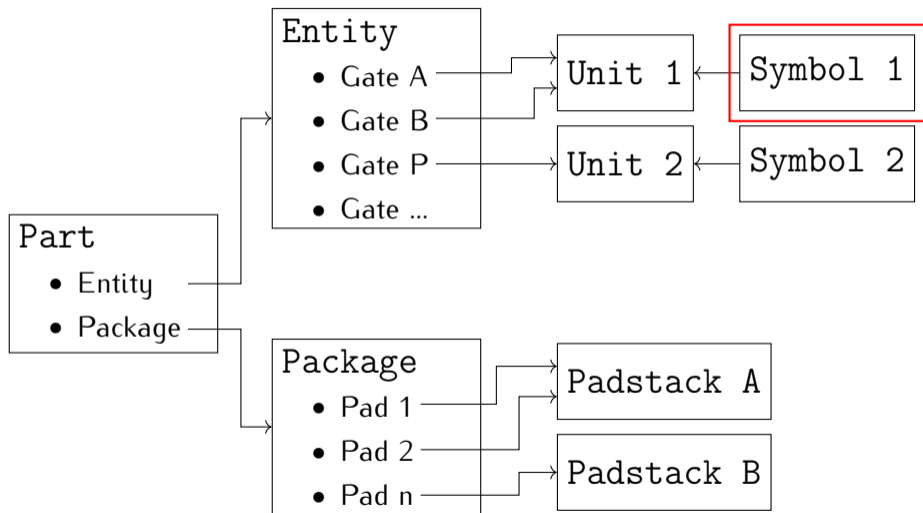
set-shape [mask-rect rectangle]

...

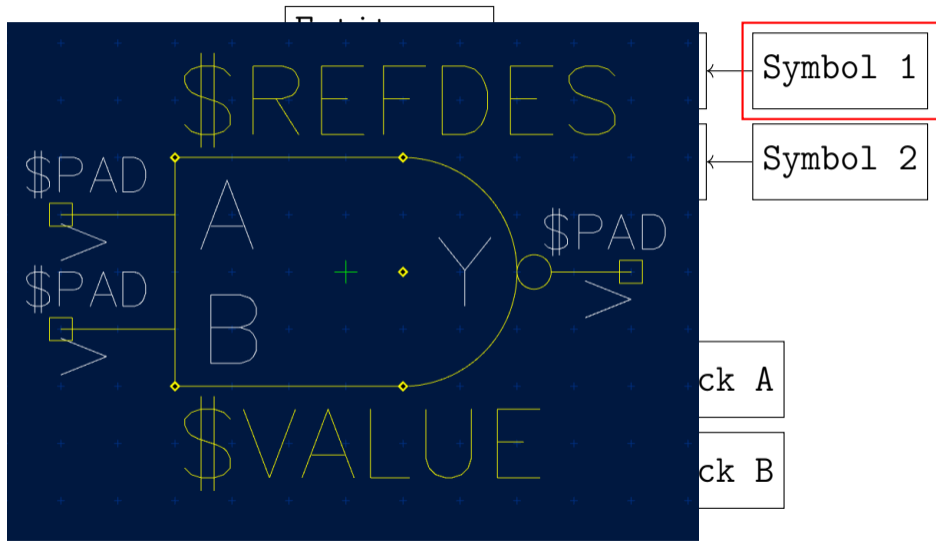
The Pool



The Pool



The Pool



Requirements for schematic editor

- Has to know about nets
- No "it's connected if it has the same name"

Netlist vs. Schematic

Requirements for schematic editor

- Has to know about nets
- No "it's connected if it has the same name"

Ideas / How it's implemented

- So why not build the schematic from the netlist?
- Netlist is edited in sync with schematic
- Schematic doesn't store net names and connectivity
- Net names are filled in from netlist

Rules

- Set track width
- Set plane parameters
- Set via sizes
- Set pad/package parameters

Rules

- Set track width
- Set plane parameters
- Set via sizes
- Set pad/package parameters

Matching

- Net
- Net class
- Net name

Rules and Checks (DRC)

Rules

- Set track width
- Set plane parameters
- Set via sizes
- Set pad/package parameters

Matching

- Net
- Net class
- Net name

Checks

- Clearances
- Track width
- Hole size

Rules and Checks (DRC)

Rules

- Set track width
- Set plane parameters
- Set via sizes
- Set pad/package parameters

Matching

- Net
- Net class
- Net name

Checks

- Clearances
- Track width
- Hole size

Framework for DRC, ERC and style checks

There's more!

What's working

- Workflow from schematic to board
- Interactive router
- Pool management with GitHub integration
- Gerber export
- Planes with thermals
- Differential Pairs
- Buses
- 3D preview, STEP export
- Airwires
- Undo/Redo
- Copy/Paste

There's more!

What's working

- Workflow from schematic to board
- Interactive router
- Pool management with GitHub integration
- Gerber export
- Planes with thermals
- Differential Pairs
- Buses
- 3D preview, STEP export
- Airwires
- Undo/Redo
- Copy/Paste

Coming soon

- Pool Convention (WIP)
- UI polish
- Assembly drawings
- Title blocks
- BOM export
- ERC
- Hierarchical designs
- Better PDF export
- Performance

Friends & Testers
People on *the internet*

Friends & Testers
People on *the internet*
KiCad Project

It's demo time!