horizon EDA

what’s new

Lukas Kramer

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FOSDEM 2019
Motivation

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 knows about nets
• Rule-driven design
• Explicit references (i.e. not by name / location)
• Make use of OpenGL 3 features
• Playground for experimentation
Why write an EDA package from scratch in 2016?

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- Playground for experimentation
Implementation

C++14
Implementation

\[ \sim 70 \text{ kLOC} \]

C++14
Implementation

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Gtk3 ≥ 3.20

C++14
Implementation

\[ \sim 70 \text{ kLOC} \]

\[ \text{C++14} \]

\[ \text{Gtk3} \geq 3.20 \]

Builds and runs on Linux and Windows
Implementation

\[\sim 70 \text{ kLOC}\]

\[
\begin{align*}
\text{JSON} \\
\text{Gtk3} \geq 3.20
\end{align*}
\]

Builds and runs on Linux and Windows
Implementation

499bf624-b2f1-4366-8b9a-0eef2c8fbb3f  \sim 70 \text{ kLOC}

\texttt{JSON}\hspace{2cm}\texttt{C++14}

\texttt{Gtk3} \geq 3.20

Builds and runs on Linux and Windows
Implementation

UUIDs

JSON

Gtk3 $\geq 3.20$

$\sim 70$ kLOC

C++14

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

Entity
- Gate A
- Gate B
- Gate P
- Gate ...

Unit 1

Unit 2

Symbol 1

Symbol 2

Part
- Entity
- Package

Package
- Pad 1
- Pad 2
- Pad n

Padstack A

Padstack B
The Pool
The Pool

Part
- Entity
- Package

Entity
- Gate A
- Gate B
- Gate P
- Gate ...

Package
- Pad 1
- Pad 2
- Pad n

Unit 1 → Symbol 1
Unit 2 → Symbol 2

Padstack A

Padstack B
The Pool

Part
- Entity
- Package

Entity
- Gate A
- Gate B
- Gate P
- Gate ...

Package
- Pad 1
- Pad 2
- Pad n

Unit
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16
- 17
- 18
- 19
- 20

Padstack A

Symbol 1

Padstack B

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The Pool

Entity

1.55mm 1.0mm
get-parameter [ solder_mask_expansion ]
2 *
+xy
set-shape [ mask-ob obround ]

1.15mm
get-parameter [ solder_mask_expansion ]
+

1.55mm
get-parameter [ solder_mask_expansion ]
2 * +
set-shape [ mask-rect rectangle ]

...
The Pool
The Pool

Entity • Package • Gate A • Gate B • Gate P • Gate ...

Package • Pad 1 • Pad 2 • Pad n • Unit 1 • Unit 2 • Padstack A • Padstack B • Symbol 1 • Symbol 2

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What’s new

First real-world board
What’s new
First real-world board
What’s new

Length tuning
### What’s new

#### BOM Export

<table>
<thead>
<tr>
<th>QTY</th>
<th>MPN</th>
<th>Manufacturer</th>
<th>Value</th>
<th>Ref. Des.</th>
<th>Package</th>
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<td>53</td>
<td>CPL-CAP-X7R-0603-100NF-50V</td>
<td>CPL</td>
<td>100 nF</td>
<td>C102, C...</td>
<td>C0603</td>
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<td>27</td>
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<td>C110, C...</td>
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<td>10 kΩ</td>
<td>R102, R...</td>
<td>R0603</td>
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<td>Murata</td>
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<td>FB101, ...</td>
<td>C0603</td>
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<tr>
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<td>10 µF</td>
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<tr>
<td>4</td>
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<td>CPL</td>
<td>120 Ω</td>
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<td>R0603</td>
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</tbody>
</table>
## What’s new

### Parametric part search

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Package</th>
<th>Value</th>
<th>Voltage rating</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taiyo Yuden</td>
<td>C1206</td>
<td>1.00 pF</td>
<td>6.3 V</td>
<td>X7R</td>
</tr>
<tr>
<td></td>
<td>C0805</td>
<td>10.00 pF</td>
<td>10 V</td>
<td>X7R</td>
</tr>
<tr>
<td></td>
<td>C0603</td>
<td>12.00 pF</td>
<td>16 V</td>
<td>X7R</td>
</tr>
<tr>
<td></td>
<td>C0402</td>
<td>18.00 pF</td>
<td>25 V</td>
<td>X7R</td>
</tr>
<tr>
<td></td>
<td></td>
<td>22.00 pF</td>
<td>50 V</td>
<td>X7R</td>
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<tr>
<td></td>
<td></td>
<td>27.00 pF</td>
<td>100 V</td>
<td>X7R</td>
</tr>
</tbody>
</table>

- **Manufacturer**: Taiyo Yuden
- **Package**: C0402
- **Value**: 100.00 pF
- **Voltage rating**: 100 V
- **Type**: COG/NPO

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What’s new

Smart head up display
What's new
Smart head up display
What’s new
Smart head up display
What’s new

Copying placement and tracks – Motivation
What's new

Copying placement and tracks – Schematic
What’s new
Copying placement and tracks – Board
What’s new

Copying placement and tracks – Board
What’s new

Copying placement and tracks – Board
What’s new

Even more

- Incremental search
- Smooth zooming
- Title blocks
- Customizable keyboard shortcuts
- Customizable colors
- Multithreaded DRC
- Edit board from bottom side
- Calculations in numerical entries
- Lasso and paint selection
- Keepouts
What’s next

Release 1.0
Release 1.0
Improve out of the box experience
User docs
github.com/carrotIndustries/horizon

github.com/carrotIndustries/x-band-tx
Friends & Testers

People on the internet
That’s it