Bosch Integrated Power Break
High Level User Story (aka Elevator Pitch)

• Plug & Produce
  • Smartness is built into conveyor belt parts
  • Installation without programming
  • Modification in operation without programming
• Adaptive Optimised One Piece Material Flow
  • Workpiece distribution for 100% process utilisation
  • Automatic reaction to changes
  • Time & Cost optimisation (- 40% according to a calculation with a real manufacturing line)
Mapping Processes to Nodes
Modes of Operation

• Relatively Static Mapping:
  • Distributed calculation of good enough mapping of processes to nodes
  • Occasional recalculation when preconditions change

• Very Dynamic Mapping:
  • Processes migrate and spawn regularly
  • Migration decision from local and regional knowledge
Erlang + Unikernel

Deploying Erlang directly on Real and Virtual Hardware

https://www.grisp.org
Research questions

• Can a distributed orchestrator map the computation in these cases

• Can we successfully run a distributed online planning algorithm on a mesh of IoT systems only?

• How could a generic extensible solution look like?

• Possible extension: Ethernet TSN path control and reservation
THE SOFTWARE STACK

TRADITIONAL ARCHITECTURE

ERLANG VM
APPLICATION
OPERATING SYSTEM
HARDWARE

OTHER SOFTWARE

GRiSP

ERLANG VM
APPLICATION
RTEMS
OTHER SOFTWARE
HARDWARE

https://www.grisp.org
# IoT Devices

<table>
<thead>
<tr>
<th>Device Type</th>
<th>MIPS</th>
<th>Memory</th>
<th>GRiSP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Micro Server</td>
<td>&gt;= 1000</td>
<td>&gt;= 1GB</td>
<td></td>
</tr>
<tr>
<td>Large Grisp Node</td>
<td>500</td>
<td>512MB</td>
<td>GRiSP 2</td>
</tr>
<tr>
<td>Medium GRiSP Node</td>
<td>100</td>
<td>64MB</td>
<td>GRiSP 1</td>
</tr>
<tr>
<td>Small GRiSP Node</td>
<td>30</td>
<td>8MB</td>
<td>SoC</td>
</tr>
</tbody>
</table>