



**Instrumentation
Technologies**

www.i-tech.si

Matej Kenda

Senior Software Development Engineer

Integration of EPICS in the BPM system

matej.kenda@i-tech.si

EPICS Collaboration Meeting, October 2008

Engineering Challenge

- **How to develop BPM instruments suitable for many different accelerators?**
- **How to keep the level of customisation low?**
- **How to minimise the level of work for integration into control systems?**

Time needed for creating and tweaking the equipment at the synchrotron decreases

Environment

Different types

- synchrotron (electron, heavy particles)
- LINAC

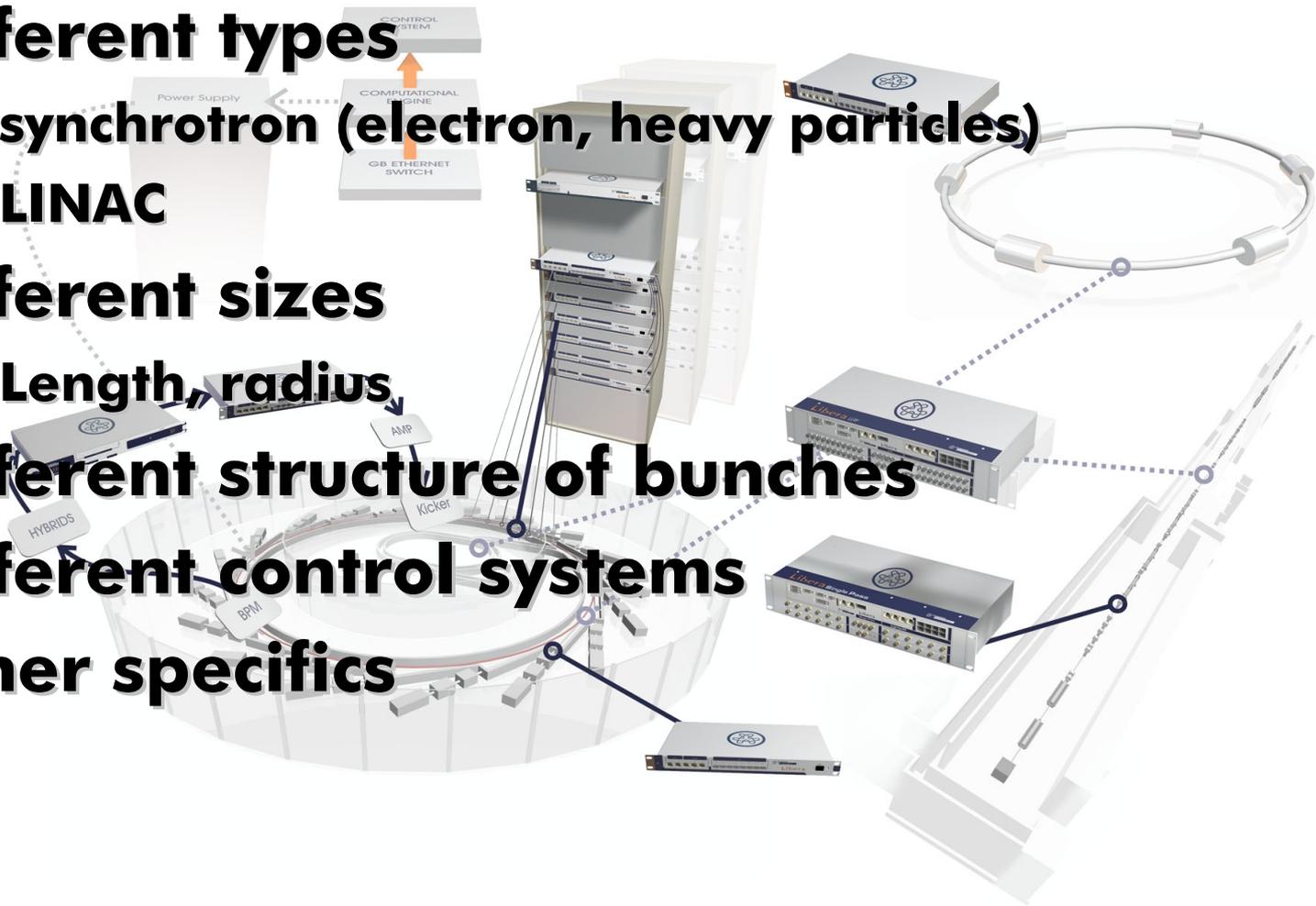
Different sizes

- Length, radius

Different structure of bunches

Different control systems

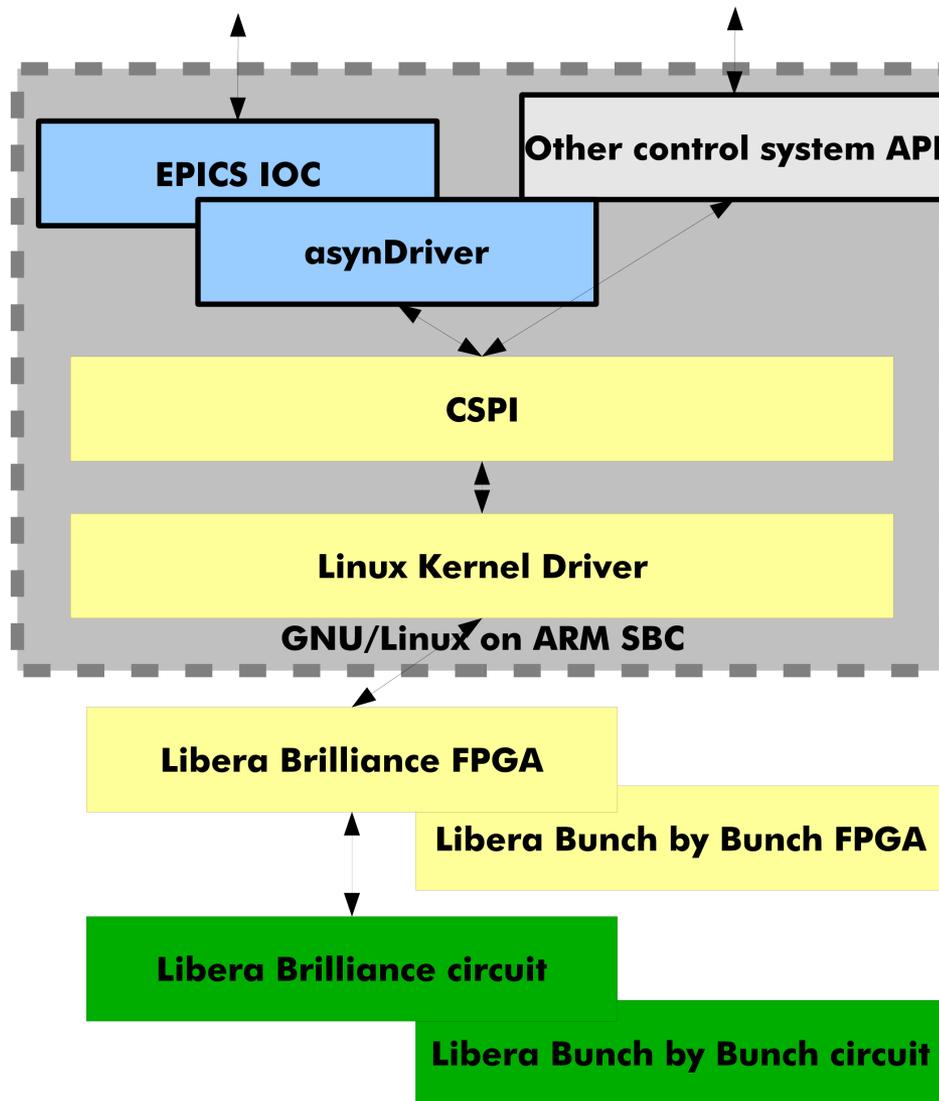
Other specifics



Solution

- **Functionality for beam position monitoring implemented in**
 - **Analog circuit board (low adaptability)**
 - **Digital circuit board (medium adaptability)**
 - **Single board computer (high adaptability)**
- **Control systems communicate with SBC**
- **Network attached devices**
 - **Controllable from central point**
 - **Collaboration of different devices**
 - Used in feedback systems
 - **Can act as an interconnected group**

Internals of Single Libera



Customisation and Integration

- **Relatively small hardware customisation**
- **FPGA customisation by numeric parameters**
- **Adaptability**
 - **Software layers designed to support different control system interfaces**
 - **FPGA Development Kit**
 - **Linux kernel driver and CSPI (GPL)**
- **Integration**
 - **EPICS driver based on CSPI is a base for integration**
 - **Often used with minor modifications**

What we are working on (or want to solve)?

- **Dynamic (runtime) definition of variables**
 - **Add/remove variables during operations**
 - **Examples**
 - cables (signals) can be attached/detached
 - digital boards can be plugged in/out
- **Make EPICS as (one of) external interfaces of Libera applications**
 - **EPICS driver is currently the main application, linking in Libera functionality**
- **Grouping PVs (optimal solution)**
 - **Multiple variables are often attributes of the same logical entity**
 - **Decreases the number of variables on the network**

Next Steps

- **Prepare EPICS drivers for new family of instruments**

- **LLRF, Single pass**

- **Increase knowledge about EPICS**

- **Contributing operational feedback and knowledge to EPICS community**

- **Update EPICS drivers to better suit the needs**

- **Gathering feedback**
- **Updates, new functionality**
- **Approaching to “Ready to use” ideal**

