Common Technical Baseline

A common reference of concepts and definitions, across all industrial sectors.

World-wide Registry Embedded Systems partners

Partners:

High-level Objectives

- Worldwide reference for Embedded Systems concepts, new (deployed) technologies

- Vector for further information and contacts

- Constantly updated by leading experts in the Embedded Systems Community

- Moderated, Didactic

Prospective Audience

- **Engineers and Technicians**
  - *Basic information on topics outside his/her direct area of expertise*
  - *To keep up to date on current and emerging technologies, products, services*
  - *White Papers*
  - *Links to online magazines and newsletters*
  - *Where to get links to further information and solutions*
  - *Trade shows and conferences*
  - *Training services*
  - *Partners and Competitors*

- **Marketing & Sales**
  - *Fast, easy, didactic source of up-to-date technical information on*
  - *Mailing lists, eg: for product announcements*

- **Integrators, Importers, Purchasing Departments**
  - *Potential suppliers of components*
  - *Quick information on emerging technologies*
  - *Partners and Competitors*

- **Investors**
  - *Quick and authoritative information on emerging technologies*
  - *Identify Partners and Competitors in a given technical area*
  - *Links to White Papers*

- **Journalists**
  - *Quick and authoritative resource for researching articles*
  - *Identify companies for interviews*
  - *Events in the area*
  - *White Papers*
  - *Links to online magazines and newsletters*

- **Public Funding Agencies**
  - *Information on topics outside their direct area of expertise, to help evaluate projects, select experts, identify funding priorities, etc*

- **Job seekers**
  - *Companies by topics*
  - *Technical information*
  - *Events in the area*
  - *Links to online magazines, newsletters*

- **Researchers**
  - *Emerging topics for research*
  - *White Papers*
  - *Links to industrial partners*
  - *Events in the area*

- **Teachers**
  including: professional training professionals, engineering schools, university professors, high school / technical school teachers, etc.
  - *To keep up to date on current and emerging technologies*
  - *Resources for teaching*
  - *Where to find links to further teaching materials*

- **Students**
  - *Easy, didactic access to technical topics*
  - *Companies for internships*

Institutional Partners

Syntec
Informatique

Direction Générale de la Compétitivité
de l'Industre et des Services

Verimag Laboratory

CEA-LIST

Université Joseph Fourier

Poles de Compétitivité

Aérospace
Valley

Minalogic

System@tic

Images & Réseaux

Contributing Partners

Airbus	**Alstom Transport**	**Continental Corporation**	**Dassault Aviation**
Esterel Technologies	**GeenSys** Global Embedded Electronics and Networked System Solutions	**Philips**	**Renault**
STMicroelectronics	**Sagem**	**Schneider Electric**	**Siemens**
Sysgo AG Real-Time Operating Systems	**Valeo**	**Volvo Trucks**	
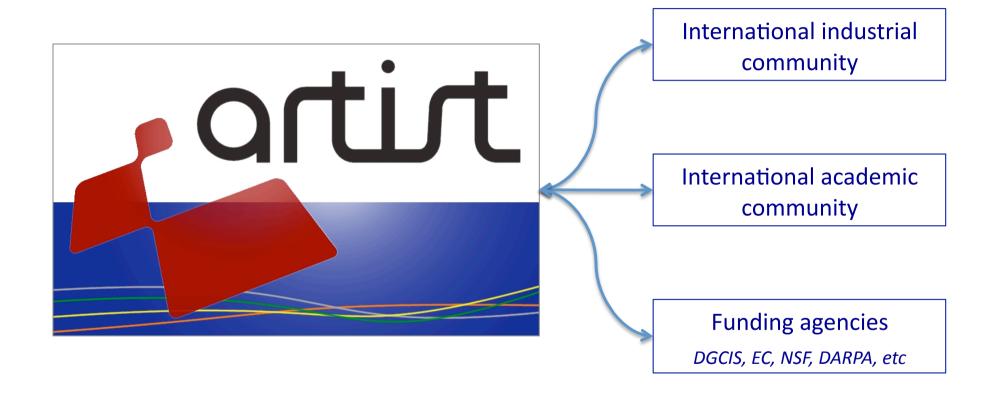
Structure of the Knowledge Base

Level 1

System View

Product Lifecycle View

Design Tools View

Design Methods View

Level 2

Buses and Networks for Embedded Systems
Certification
Change Management
Code Generation
Configuration Management
Control Flow Analysis
Controller Area Network (CAN)
DSP
Data Flow Analysis
Deployment
Development Assurance Level
Device Drivers
Direct Memory Access (DMA)
Electronic Control Unit (ECU)
Embedded Operating System
Environmental Modeling
Executable image(s)
Fault Correction
Feature Design
FlexRay
Floating Point Unit
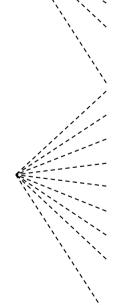Formal Methods
Frame Programmable Gate Array

Level 3

A DSP (Digital Signal Processor) is capable of providing:

- very high performance
- low production costs
- low energy consumption
- real time operation
- high interrupt rates
- intensive numeric computations

for specific types of repetitive tasks such as Fast Fourier transforms, digital filters, pattern recognition, image processing and speech recognition.

They are key components for many types of applications, such as audio, video and multimedia peripherals, disk drives and image processing systems for medical and scientific applications.

Diagram   *Diagram*   *Text*

CTB Embedded Systems

A Distributed Embedded System
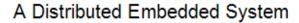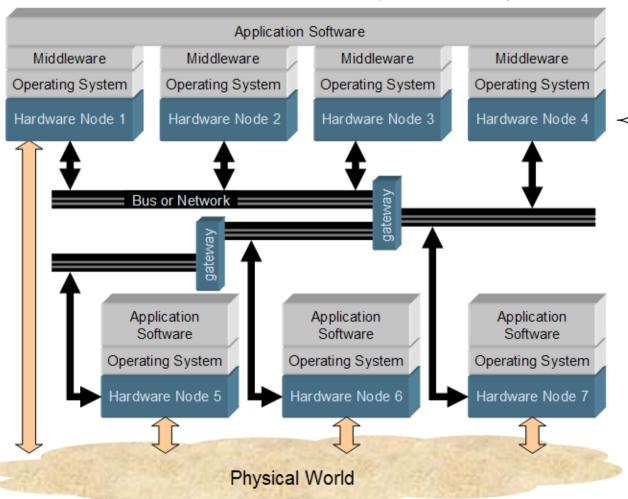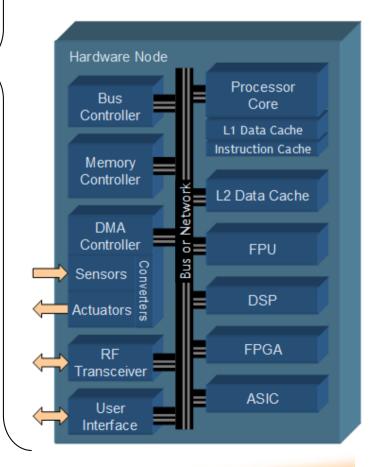
Each Hardware Node can be considered as a separate Embedded System

A Hardware Node may be composed of different combinations of components
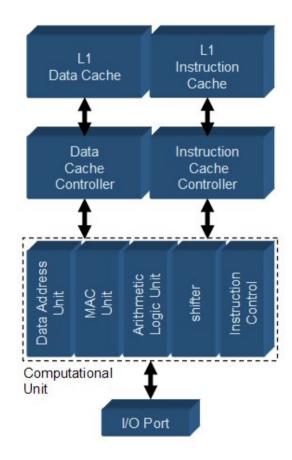
Clickable Level 2 Diagrams => Level 3 texts

DSP


```
        L1                L1
    Data Cache      Instruction Cache

        Data            Instruction
       Cache              Cache
     Controller         Controller

  [Data Address Unit | MAC Unit | Arithmetic Logic Unit | shifter | Instruction Control]
  Computational Unit

                I/O Port
```

click on the boxes in the diagram,
to see the detailed text

Overview

A DSP (Digital Signal Processor) is capable of providing:

- very high performance
- low production costs
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- real time operation
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- intensive numeric computations

for specific types of repetitive tasks such as Fast Fourier transforms, digital filters, pattern recognition, image processing and speech recognition.

They are key components for many types of applications, such as audio, video and multimedia peripherals, disk drives and image processing systems for medical and scientific applications.

-- *External links* --

- Courseware: **DSP Architecture**- *Politecnico di Milano*
- Article: **Understanding the reuse of a DSP architecture for different designs (Ceva)**
- Dictionary: **BDTI's DSP Dictionary**
- **Electronics Information Online**

Level 2 : Diagram   *Level 3 : Text*
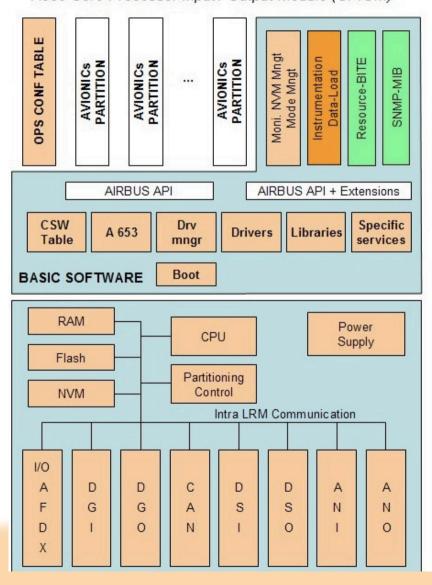
Example Architectures

Airbus A380 - Integrated Modular Avionics (IMA)

A380 Core Processor Input / Output Module (CPIOM)
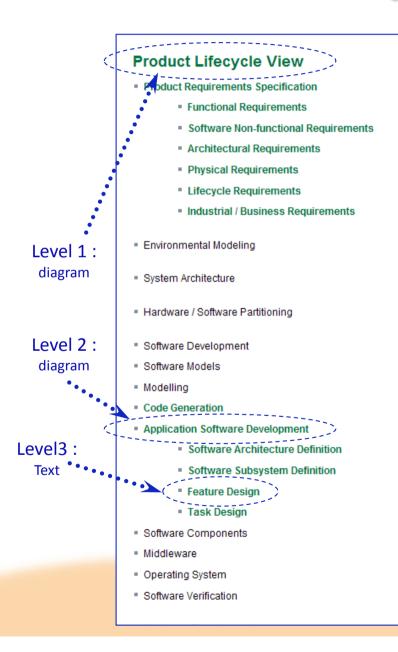
CPIOM Basic Software

- The Airbus API is based on the ARINC 653 Standard
- CSW tables : Tables internal to the Core SoftWare
- A 653 : ARINC 653 (Standard of API)
- DRV MNGR : Drivers manager
- Drivers : CPU Driver, IO Driver, Ã¢â‚¬Â¦.
- Libraries : Libraries of the OS : C library, etc.
- Specific services : offered by the O.S. to the System Applications
- System partitions (software partitions similar to application partitions, b privileged access to specific services of the OS) :
  - MONIT NVM = Management of the Non Volatile Memory
  - Instrumentation DAtaLoad = Downloading function, compliant to A instrumentation
  - resource BITE : Built In Test Equipment of the computer resource
  - SNMP-MIB : Simple Network Management protocol-Management
- BOOT : to start the CPIOM up.

-- See also (internal links) --
- **A380 Core Processor Input/output Module (CPIOM)**
- **CPIOM - Avionics Partitions**
- **CPIOM Hardware**
- **Development Assurance Level (DAL)**

Site Map : logical outline of the contents

CTB
Embedded Systems

Product Lifecycle View

- Product Requirements Specification
  - Functional Requirements
  - Software Non-functional Requirements
  - Architectural Requirements
  - Physical Requirements
  - Lifecycle Requirements
  - Industrial / Business Requirements

- Environmental Modeling

- System Architecture

- Hardware / Software Partitioning

- Software Development
- Software Models
- Modelling
- Code Generation
- Application Software Development
  - Software Architecture Definition
  - Software Subsystem Definition
  - Feature Design
  - Task Design
- Software Components
- Middleware
- Operating System
- Software Verification

Level 1 : diagram

Level 2 : diagram

Level3 : Text

System View

- Application Software Development
  - Software Architecture Definition
  - Software Subsystem Definition
  - Feature Design
  - Task Design

- System Software Layer
- Kernel
- Middleware
- Operating System
- Device Driver

- Hardware Layer
- Buses
- Core
- DSP
  - L1 Data Cache
  - Instruction Cache
  - MAC: Multiply and ACcumulate Unit
  - ALU: Arithmetic Logic Unit
  - Shifter Unit
  - Computational Unit
  - I/O Port
- FPGA and ASICs
- L2 Cache
- Main Memory
- D/A Converters

Design Tools View

- Product Requirements Specification
  - Functional Requirements
  - Software Non-functional Requirements
  - Architectural Requirements
  - Physical Requirements
  - Lifecycle Requirements
  - Industrial / Business Requirements
- Environmental Modeling
- System Architecture

- Software Model Library
- Software Modelling Tools
- Software Models
- Code Generation
- Model Verification Tools

- Software algorithms and coding
- Software Design Tools
- Software
- Application Software Development
  - Software Architecture Definition
  - Software Subsystem Definition
  - Feature Design
  - Task Design
- Software Verification
- Hardware-aware Compiler

- Middleware

Index

Alphabetical list of links to:
- Level 1 Views
- Level 2 Diagrams
- Level 3 texts

Each index entry also contains a link to the

- <u>Level1 View(s)</u> or

- <u>Level2 Diagram</u>

that contains it.

- **ALU: Arithmetic Logic Unit** *(within DSP)*
- **Actors** *(within Use Cases)*
- Actuators *(within System View)*
- **Application Software Development** *(within System View, Product Lifecycle View, Desig*
- **Architectural Requirements** *(within Product Requirements Specification)*
- **Assumptions** *(within Use Cases)*
- **Build Prototype** *(within HW SW Integration)*
- Buses *(within System View)*
- **Certification** *(within Product Lifecycle View, Lifecycle Management)*
- **Change Management** *(within Product Lifecycle View, Lifecycle Management)*
- **Code Generation** *(within Product Lifecycle View, Design Tools View)*
- **Computational Unit** *(within DSP)*
- **Configuration Management** *(within Product Lifecycle View, Lifecycle Management)*
- **Control Flow Analysis** *(within Code Generation)*
- Core *(within System View)*
- D/A Converters *(within System View)*
- **DMA** *(within System View)*
- **DSP** *(within System View)*
- **Data Flow Analysis** *(within Code Generation)*
- Deployment *(within Design Methods View)*
- Device Driver *(within System View)*
- Embedded System *(within Design Tools View)*
- Environmental Modeling *(within Product Lifecycle View, Design Tools View, Design Meth*
- Executable image(s) *(within Design Tools View)*

On-line editing tool for experts

Common Technical B...
Embedded Systems Gui...
Free in-depth, easy to understand diagrams...

» Product Lifecycle View   » Lifecycle Management   » Configuration Management
» Design Tools View

Lifecycle Management

Requirements Management

Change Management

Product Data Management

Configuration Management

Certification

Use Cases Management

Configuration...

Configuration mana...

- It should aim fo...
- It takes into acc...
- It helps to mana...
- Identification cc... software.
- Should manage... Configuration n...

NB: At its core, th... management proble... never have been ab...

-- See also (interna...
- **Certification**
- **Change Manag...**
- **Product Data N...**
- **Requirements...**

CTB Editor   *propose changes to the current page*   close

| Edit title/text | Add page | Internal links | External links |

Changing the title and contents of the current page

Lifecycle Management   *see formatting tips below*

Configuration Management

Configuration management should ideally be a strong complement to project management.
- It should aim for the final, integrated embedded system (both hardware and software).
- It takes into account the need for efficient use of resources
- It helps to manage costs and the hw/sw development schedule.
- Identification codes, processes, formalisms, and tools should be the same for both hardware and software.
- Should manage change proposals (including status, etc).
Configuration management should be fully integrated into the product development processes.

NB: At its core, the software fault that led to the loss of the Ariane 5 rocket was a configuration management problem. The rocket included a software module intended for a previous design, that should never have been aboard and active.

Save   *Optional private comment to the moderator*

Formatting tips

The CTB editor provides a few easy-to-use formatting capabilities:
- Boldface
  This is done by surrounding the relevant text in the editor with double curly brackets (eg: this will be in {{boldface}} in the rendered webpage.)
- Italics
  In the same way, text surrounded by single curly brackets will be rendered in italics

Ensuring that the contents are up to date

- Each element of information is dated

- The CTB identifies the lists of information to be re-validated or updated
  (and of course the community is invited to update the contents). Different types of information have different validity durations.

- *CTB prepares emails to the moderators to request revalidation and/or updates*
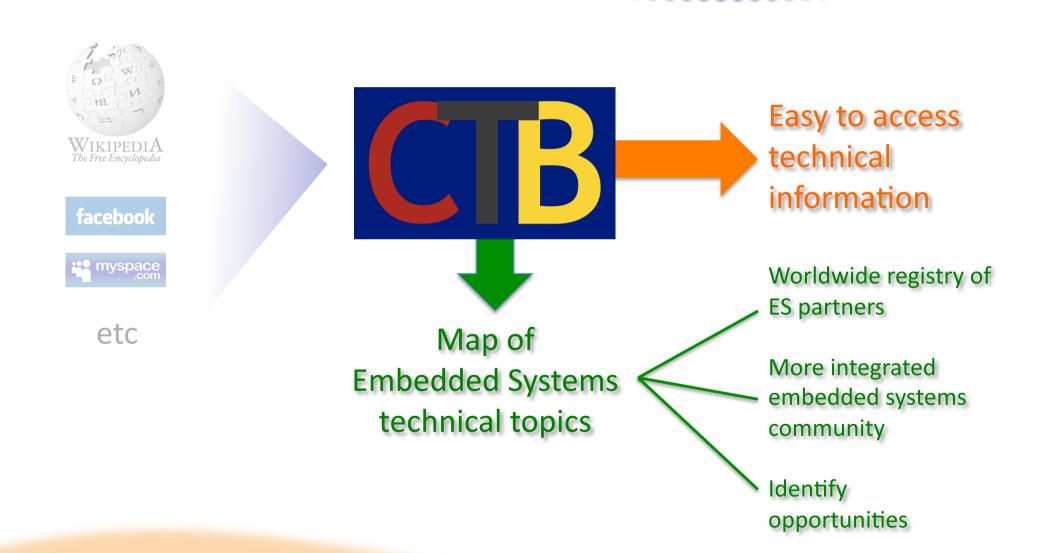
Additional information

- Upcoming Events *(conferences, trade shows, summer schools)*

- Online magazines and publications

- Leading White Papers and books in the area

- Resources for teaching

- Videos *(eg: Artist Summer School)*

- Open Calls *(European Commission, NSF, etc)*

- Moderated mailing lists, according to topics

*Each of these can be made available globally,
and within the context of selected CTB topic pages*

Worldwide registry of ES partners

- Individual companies, research teams, large R&D initiatives, consortia may sponsor the CTB, and have a logo and link appear on selected pages.

- Each member company gets a limited number of pages, to ensure they choose the most relevant topics.

- The user may select companies according to criteria, such as:
  – Hw/sw component providers
  – Training providers
  – Manufacturers / integrators
  – Geography (eg: North American companies)
  – Research teams

- Main advantage is instant worldwide visibility

Business Model

Map of Embedded Systems
technical knowledge

Worldwide registry of companies & institutions
providing tools, hw/sw components, services, training, research

Companies & institutions pay a small annual membership fee (~1000€) for
premium listing, and access to extended services.

Matchmaking between industrial partners and research teams

- Research teams generally have difficulty finding industrial teams teams willing to provide case studies.

- Industrial partners have difficulty knowing which research teams are capable of addressing their hard problems.

- We will allow industrial partners to <u>anonymously</u> post their hard research problems, in the context of the CTB pages.

- Research teams can then respond (non-anonymously) to the problems posted, via an on-line form. Specific criteria may be requested by the industrial partner.

- We currently have over 600 companies logos, URL, meta-information, referenced in the database

Partnering with the Common Technical Baseline

- Members may propose content (diagrams and texts) for the CTB technical pages.

- Members may benefit from additional services (matchmaking), and reference their events on the CTB.

- Annual membership fee is 1000 €.

Positions to be created in 2011

Currently looking for start-up financing

Positions to be created in 2011

- Salesperson (permanent)

- Moderator (permanent)

- Webmaster (temporary)

Where can I find it ?

Google: embedded ctb

or: http://embedded-systems-portal.com/CTB/

Please do:
- Use it as a reference
- Link to the website
- Contribute to the contents if you have state of the practice knowledge that can be added.