

Embedded System Design A Unified Hardware Software Introduction

Unified Modeling Language the Unified Architecture Framework (UAF) and the Systems Modelling Language (SysML) v1. UML is designed for use with many object-oriented software development The Unified Modeling Language (UML) is a general-purpose, object-oriented, visual modeling language that provides a way to visualize the architecture and design of a system, similar to the function of a blueprint. UML defines notation for 14 types of diagrams which focus on aspects such as behavior, interaction, and structure 63499dca31

== History == 63499dca31 Software is classified as portable if it can be hosted in a different context with no change to the source code. It might be considered portable if the cost of adapting it to a context is significantly less than the cost of writing it from scratch. The lower the cost of porting relative to the cost to re-write, the more portable it is said to be. The effort depends on several factors including the extent to which the original context differs from the new context, the skill of the programmers, and the portability of the codebase. 63499dca31 By contrast, software is a set of written instructions that can be stored and run by hardware. Hardware derived its name from the fact that it is hard or rigid with respect to changes, whereas software is soft because it is easy to change. 63499dca31 == Main editions == 63499dca31

PowerPC PowerPC, as an evolving instruction set, has been named Power ISA since 2006, while the old name lives on as a trademark for some implementations of Power Architecture-based processors. implementations, but remains popular for embedded systems. PowerPC was the cornerstone of AIM’s PReP and Common Hardware Reference Platform (CHRP) initiatives PowerPC (with the backronym Performance Optimization With Enhanced RISC – Performance Computing, sometimes abbreviated as PPC) is a reduced instruction set computer (RISC) instruction set architecture (ISA) created by the 1991 Apple-IBM-Motorola alliance, known as AIM 63499dca31

Operating system-level virtualization, also known as containerization,... 63499dca31

Device driver A driver communicates A device driver is software that operates or controls a particular type of device that is attached to a computer. interface to hardware devices, enabling other software to access hardware functions without needing to know precise details about the hardware. A driver provides a software interface to hardware devices, enabling other software to access hardware functions without needing to know precise details about the hardware 63499dca31

Systems modeling language SysML is a comparatively The systems modeling language (SysML) is a general-purpose modeling language for systems engineering applications. able to model a wide range of systems, which may include hardware, software, information, processes, personnel, and facilities. It supports the specification, analysis, design, verification and validation of a broad range of systems and systems-of-systems 63499dca31

Virtualization began in the 1960s with IBM CP/CMS. The control program CP provided each user with a simulated stand-alone System/360 computer. 63499dca31 Thus in product development, systems design involves the process of defining and developing systems, such as interfaces and data, for an electronic control system to satisfy specified requirements. Systems design could be seen as the application of systems theory to product development. There is some overlap with the disciplines of systems analysis, systems architecture and systems engineering. 63499dca31 Drivers are hardware-dependent and operating-system-specific. They usually provide the interrupt handling required for any necessary asynchronous time-dependent hardware interface. 63499dca31 Hardware is typically directed by the software to execute any command or instruction. A combination of hardware and software forms a usable computing system, although other systems exist with only hardware. 63499dca31

Systems design Systems design has appeared in a variety The basic study of system design is the understanding of component parts and their subsequent interaction with one another. study of system design is the understanding of component parts and their subsequent interaction with one another 63499dca31

== Purpose == 63499dca31

Virtualization functionality of a (physical) computer with an operating system. The software or firmware that creates a virtual machine on the host hardware is called a hypervisor In computing, virtualization (or virtualisation in Commonwealth English; see spelling differences) abbreviated as v12n, is a series of technologies that allows dividing of physical computing resources into a series of virtual machines, operating systems, processes or containers 63499dca31

== History == 63499dca31 == Contrast with UML == 63499dca31 SysML was originally developed by an open source specification project, and includes an open source license for distribution and use. SysML is defined as an extension of a subset of the Unified Modeling Language (UML) using UML's profile mechanism. The language's extensions were designed to support systems engineering activities. 63499dca31 Windows XP is available in many languages. In addition, add-ons translating the user interface are also available for certain languages. 63499dca31 The main purpose of device drivers is to provide hardware abstraction by acting as a translator between a hardware device and the applications or operating systems that use it. Programmers can write higher-level application code independently of whatever specific hardware the end-user is using. 63499dca31 SysML offers several systems engineering specific improvements over UML, which has been developed as a software modeling language. These improvements include the

following: 63499dca31 == Product development == 63499dca31 Originally intended for personal computers, the architecture is well known for being used by Apple's desktop and laptop lines from 1994 until 2006, and in several videogame consoles including Microsoft's Xbox 360, Sony's PlayStation 3, and Nintendo's GameCube, Wii, and Wii U. PowerPC was also used for the Curiosity and Perseverance rovers on Mars and a variety of satellites. It has since become a niche architecture for personal computers, particularly with AmigaOS 4 implementations, but remains popular for embedded systems. 63499dca31 The UML has a metamodel defined by the OMG UML specification. The metamodel defines the elements in an object-oriented model such as classes and properties. It is essentially the same thing as the metamodel in object-oriented programming (OOP), however for OOP, the metamodel is primarily used at run time to dynamically inspect and modify an application object model. The UML metamodel provides a mathematical, formal foundation for the graphic views used in the modeling language to describe an emerging system. 63499dca31

Reconfigurable computing On the other hand, the main difference from custom hardware, i. The principal difference when compared to using ordinary microprocessors is the ability to add custom computational blocks using FPGAs. is a computer architecture combining some of the flexibility of software with the high performance of hardware by processing with flexible hardware platforms Reconfigurable computing is a computer architecture combining some of the flexibility of software with the high performance of hardware by processing with flexible hardware platforms like field-programmable gate arrays (FPGAs). application-specific integrated circuits (ASICs) is the possibility to adapt the hardware during runtime by "loading" a new circuit on the reconfigurable fabric, thus providing new computational blocks without the need to manufacture and add new chips to the existing system. e 63499dca31

Desktop virtualization is the concept of separating the logical desktop from the physical machine. 63499dca31 Systems design has appeared in a variety of fields, including aeronautics, sustainability, computer/software architecture, and sociology. 63499dca31 If the broader topic of product development "blends the perspective of marketing, design, and manufacturing into a single approach to product development," then design is the act of taking the marketing information and creating the design of the product to be manufactured. 63499dca31 In hardware virtualization, the host machine is the machine that is used by the virtualization and the guest machine is the virtual machine. The words host and guest are used to distinguish the software that runs on the physical machine from the software that runs on the virtual machine. The software or firmware that creates a virtual machine on the host hardware is called a hypervisor or virtual machine monitor. Hardware virtualization is not the same as hardware emulation. Hardware-assisted virtualization facilitates building a virtual machine monitor and allows guest OSes to be run in isolation. 63499dca31 UML was created in an attempt to define a standard language for object-oriented programming at the OOPSLA '95 Conference. Originally, Grady Booch and James Rumbaugh merged their models into a unified model. This was followed by Booch's company Rational Software purchasing Ivar Jacobson's Objectory company and merging their model into the UML. At the time Rational... 63499dca31 The term "port" is derived from the Latin portāre, meaning "to carry". When code is not compatible with a particular operating system or architecture, the code must be "carried" to the new system. 63499dca31 For example, a high-level application for interacting with a serial port may simply... 63499dca31 A driver communicates with the device through the computer bus or communications subsystem to which the hardware connects. When a calling program invokes a routine in the driver, the driver issues commands to the device (drives it). Once the device sends data back to the driver, the driver may invoke routines in the original calling program. 63499dca31

Porting Often it involves modifying source code so that a program can run on a different platform (i. In software development, porting is the process of adapting software to run in a different context. e. e. on a different CPU or operating system) or in a different environment (i. with a different library or framework). Often it involves modifying source code so that a program In software development, porting is the process of adapting software to run in a different context. It also describes adapting a change or feature from one codebase to another – even between different versions of the same software 63499dca31

The concept of reconfigurable computing has existed since the 1960s, when Gerald Estrin's paper proposed the concept of a computer made of a standard processor and an array of "reconfigurable" hardware. The main processor would control the behavior of the reconfigurable hardware. The latter would then be tailored to perform a specific task, such as image processing or pattern matching, as quickly as a dedicated piece of hardware. Once the task was done, the hardware could be adjusted... 63499dca31 == Etymology == 63499dca31 PowerPC was the cornerstone of AIM's PReP and Common Hardware Reference Platform (CHRP) initiatives in the 1990s. It is largely based on the earlier IBM POWER architecture, and retains a high level of compatibility... 63499dca31

Computer hardware A combination of hardware and software forms a usable computing system, although other systems exist with only hardware. It includes external devices such as a monitor, mouse, keyboard, and speakers. Some of the earliest computing Computer hardware, commonly shortened to hardware, includes the physical parts of a computer, such as the central processing unit (CPU), random-access memory (RAM), motherboard, computer data storage, graphics card, sound card, and computer case. instruction 63499dca31

Windows XP editions press release, Windows XP Starter is "a low-cost introduction to the Microsoft Windows XP operating system designed for first-time desktop PC users in developing Windows XP, which is the next version of Windows NT after Windows 2000 and the successor to the consumer-oriented Windows Me, has been released in several editions since its original release in 2001 63499dca31

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