Tao Technology Glossary

- ANSI-C Libraries

The American National Standards Institute's version of C. A group of libraries in ANSI-C have been optimised entirely for data manipulation commands. The standard library functions are implemented in Elate®.

- API

Application Programming Interface. This specifies how any programmer writing an application interfaces to lower level software, such as the device drivers.

- Application

An application is one or more processes co-operating to achieve a result.

- Asynchronous Message Passing

Messaging does not halt sending, so that once the message has been sent the sender need not wait for the message to be received by the destination process. This is the default behaviour in Elate, but it can be overridden.

- Atom

An integer which directly and uniquely corresponds to a particular string.

- Attributes

These define the type of fields used by that particular class.

- Breakpoint

An instruction which halts code execution. This is usually used during debugging to locate a place where an error has occurred.

- C/C++ Compiler

A program used to convert C or C++ source code into VP source code. The assembler is then used to convert this into VP binary code. This particular arrangement may be changed in the future so as to generate VP binary code directly through the compiler itself.

- Class

A description of the attributes and methods of an object. One creates an instance of a class to obtain an object, which may be acted upon e.g. methods which may be called, attributes which may be changed. In addition, a class may have parent classes, from which it "inherits" attributes and methods.

- Concurrent

This term refers to processes that could, logically, be executing on separate processors. Whether this is implemented by time-slicing on a single processor or executing in parallel on separate processors is a run-time consideration.

- CII

CPU Isolation Interface. This interfaces between the kernel and the processor. It contains all of the necessary processor specific functions, such as the loading and storage of data onto the processor, and obtaining information about a process workspace.

- Defaultmethod

The default method of a class is activated when a programmer attempts to invoke a non-existent method on that class. The default method may take a number of actions, for example, it can raise an error or attempt to locate a suitable method on its parent class.

- Deterministic

A computer system is classed as deterministic if it repeatedly performs one or more actions in a set time scale.

- Device Drivers

These provide a range of services from interfacing to hardware to providing software only services. They offer a generic API to a device family.

- Disassembler

This reverses the transformations produced by the assembler, and converts machine code into a textual sequence.

- DMA

Direct Memory Access. This may be used by any device to transfer data between the device and the memory without the intervention of the processor. This is used to facilitate the quick transference of large amounts of data.

- Dynamic Binding

This facet of Elate's structure ensures that individual tools are loaded into memory, translated and bound into applications only as and when required.

- DSP

Digital Signal Processor. A type of processor used to manipulate especially high speed signals.

- Endianess

Endianess refers to the order in which the bytes and shorts are stored in the integers, and long integers are stored in memory. A 'big endian' processor places the most significant byte first. The more common 'little endian' processor places the least significant byte first. Elate's Virtual Processor is little endian, but conversion can be easily carried out to enable it to run on big endian processors.

- Exception handler

Utility for coping with exceptional cases liable to cause problems in the execution of a program, for instance a deadline failure. If the exception is one that can be dealt with, normal execution ought to resume after the exception handler has finished.

- Garbage Collection

A process by which Elate returns blocks of memory to the free pool.

- Global Pointer Register

A pointer to the global data area for each process.

- Hardware Independence

Elate applications run on different processor architectures without any re-compilation of programs.

- Inheritance

Inheritance is a means by which one class may modify or reuse the behaviour of another class. If "A inherits from B" we say that "A is a sub-class of B". This is a static class based relationship.

- Inline code

A section of code that is embedded within the calling tool, rather than being called in its own right. This avoids the necessity of a call and return to an external tool.

- Instance

Creating an instance of a class results in memory being allocated to provide storage for its various attributes and runtime-structures, as well as running a constructor or initialisation routine. The result is an instance of the given class. There can be more than one instance of a class.

- Interrupt

An interruption caused to an operation in the process of execution. It is created by an event affecting the attached hardware, eg a key on the keyboard being pressed.

- I.S.R

Interrupt Service Routine. This is device specific code used to service the interrupts that are generated by the hardware.

- Kernel

A set of tools which provide basic system services, such as memory allocation, and process handling.

- Leaf tools

Leaf tools are tools that do not reference other tools.

- Link Drivers

These are responsible for off chip mail message handling, so as to allow communication between different processors.

- Load Balancing

Elate balances tasks between processors, including processors of differing type, or connectivity.

- Mailbox

Messages sent between processes go through mailboxes. Where messages must be sent between different processors it will be sent through a link driver.

- Message Passing

Processes communicate by sending messages. A message has a source mailbox, a destination mailbox and a payload. Processes have to check mailboxes in order to receive messages. Once sent the message is no longer the responsiblity of the sender.

See also synchronous and asynchronous message passing.

- Method

A method defines an operation performed by an object of a particular class. Methods may be accessible to sub-classes and/or other classes. A sub-class may override (replace) a method of it’s base or parent class.

- Multitasking

Creates the appearance of a number a tasks being executed at the same time. This is achieved by having the processor switch rapidly between tasks, executing a few instructions from each according to a set of well-defined rules.

- Multithreading

In a multi-tasking environment it is possible for several copies of the same program to be running at the same time. Traditionally, this requires a separate copy of the program-code to be held in memory for each task. Multi-threading is a means by which several tasks may all share a single copy of a common section of executable code, at the same time, thereby reducing the demands on memory.

- Ncall

A named call mechanism for the calling of a method, which only requires the name of a method rather than the precise address.

- Object

An object is an instance of a class. For further information see instance.

- OOP

Object Oriented Programming. Traditionally, code has been written using either a ‘functional’ approach where the design effort is centred on the production of algorithms and program-code which, through a series of discrete steps, will achieve the desired results, or a data driven approach where the data taken into the system is subdivided into data items, upon which operations are subsequently defined.

Object-oriented programming concentrates on both data and functions. It classifies problem space by taking both into account, thus defining the roles and responsibilities of particular classes.

- Parallel Processing

Processes executing in parallel, either by multitasking on a single processor, or on multiple processors.

- PII

Platform Isolation Interface. This specifies how the Elate kernel and device drivers can interface to the underlying hardware or software. It consists of a series of tools, some of which are written in native code.

- PIL

Platform Isolation Layer. A generic term for all the platform specific code. It consists of the platform isolation interface, and platform specific device drivers.

- Process

A group of one or more threads executing the code contained in one or more tools. Applications are composed of one or more processes, and processes are composed of one more threads. For most practical purposes the two may be regarded as synonymous, the principal distinction between the two being that in context switching threads are more lightweight than processes.

- Qcall

Causes execution of the code contained within a specified tool. If the tool is not already in memory it will be loaded from storage and made accessible, after which the tool's code will be executed. If a tool contains a qcall to another tool, the translator generates fixup records which are processed by the kernel's dynamic binder when the tool is brought into memory for whatever reason. There are two variants upon the normal type of qcall:

- Normal

When the calling tool is loaded, the dynamic binder attempts to find the referenced tool, and if necessary, will load, translate and bind it. When this is completed, the reference to the tool is converted into a pointer to the tool's code. After the code generated by the translator for the qcall has been executed, a direct call to the qcalled tool will also be executed.

- Qcall + Virtual

When the calling tool is translated, the translator generates a call to a kernel function which finds the specified tool, increments its reference count and calls it. When the call returns, the kernel function decrements the reference count, and the kernel function returns to the calling tool. The operation of the kernel function is invisible to the calling tool, and the action appears exactly the same as that for a normal qcall.

The advantage of this method is that since the called tool is not referenced by the calling tool except during the period when its code is actually executing, the called tool's code can be flushed out of memory if necessary (perhaps due to shortage of memory), and will be automatically reloaded if necessary.

- Virtual + Fixup

By using virtual+fixup calls, the tools which are not used are never loaded, but the tools which are used execute as fast as a normal qcall (except for the first call, where the tool may need to be loaded, translated and bound).

The advantage of this method is that the called tool's code is not loaded into memory, translated and bound until it is actually called. This can significantly speed up initial startup of a program which references many tools.

- Real time

This term is used describe a system that is guaranteed to respond to events within a set time scale.

- RISC

Reduced Instuction Set Computer. Microprocessors tend to have long sets of operations that they can perform. Of these however comparatively few are usually necessary. In the case of an RISC the instruction sets are smaller, thereby increasing efficiency.

- Signature

A signature is simply the value of an atom (the integer, not the string), used in the context of an Elate object method-call.

- Singlestepping

The facility to execute single instructions. Usually used in debugging to identify errors.

- Synchronous Message Passing

Messaging halts sending, while the sender waits for the message to be received.

- Sysgen

System Image Generation. This utility analyses the relevant application in order to determine what tool references it will require, and then builds these into a target image. In cases where no native or custom tools are found, the VP version will be translated and used.

- Thread

A thread represents a currently executing path of execution through some code - and therefore usually through a number of tools.

- Tool

A tool is usually an executable thread of code that can be re-located, loaded & bound on demand. All tools are re-entrant and can therefore be used in a multithreaded manner. A tool may represent a method or function. A set of tools may be grouped into a class.

- Translation

The stage at which VP code is converted in to native for execution. This takes place either during load time or during sysgen operation, unless the code has been pre-translated.

- Virtual Processor

The Elate Virtual processor is the specification of a 32bit imaginary processor.

- VP Assembler

A program used to convert VP source code into VP binary code, or source code into native binary code.

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