

## Frequently Asked Questions

### What benefits does RealFusion deliver across an organisation?

1. CEO - You will be able to confidently plan your business around a more stable and cost effective, high performance ICT environment.
2. CIO - You will be able to increase the efficiency of you ICT environment through better asset utilisation and increased application performance. Your investment in older applications will last longer, and can be enhanced to perform across multiple processors and you will be able to build new applications that are more efficient and can leverage the full capabilities of multi-core hardware. Your investment in multi-core hardware for energy efficiency will enable you to gain "green" efficiencies for your business. You will be able to build reliable, sustainable and flexible services within your environment and establish your own "Cloud Computing" within your business.
3. Architect - You will be able to architect parallelised applications that will be faster and more efficient. You will also be able to architect a cloud computing environment within your organisation, based on RealFusion and its capability to enable applications to operate across any available processor within the ICT environment.
4. Support Manager - You will have applications that are easy to maintain and manage.
5. Development Manager - You will be able to develop new more efficient applications that are built with inherent parallelism to operate on the new multi-core hardware.
6. Developer - You will not need to undergo extensive retraining to work with RealFusion. RealFusion is based on industry standard tools and languages, with a GUI based, Object Oriented development tool set. With this you will be able to develop parallelised applications that are much more efficient and capable of leveraging the processing power of multiple processors.

### Who can use RealFusion?

RealFusion products integrate seamlessly with existing development frameworks and applications in Java, .Net and C++. RealFusion provides standard integration methods with both Java Standard Edition (Java-SE) and Java Enterprise Edition (Java-EE):

Java Standard Edition - RealFusion platform provides for integration with clients through direct library access to the RealFusion run-time.

Java Enterprise Edition - RealFusion provides a standardised resource adaptor as per the Java Connector Architecture (JCA) v. 1.5. In this respect, the integrity of services such as transactions and security are handled as a consequence of integration through the RealFusion Java Connector, making integration with high-end business systems efficient and safe.

### What is RealFusion and what does it do for legacy (older) and new applications?

RealFusion is a decentralised coordination middleware platform for the production of high-performance, scalable and reliable distributed applications which leverage all the benefits of networked multi-core computing infrastructure. It has been designed and built to be used by developers and consultants without the need extensive or expensive retraining.

RealFusion is a development platform incorporating GUI based tools and management capabilities for the building of multi-core enabled applications. Its specialised middleware reactively coordinates the computational requirements of applications across all available processors within the nominated ICT environment.

Legacy applications can become parallelised in operation, enabling efficient use of multiple processor cores, providing faster processing of transactions. Importantly, the enhancements involve little or no changes to application code, meaning a faster transition and very low risk.

New applications can be written directly as parallelised applications. This means that a new application will automatically be able to leverage the full capabilities of multi-core technology.

### How is RealFusion unique from other middleware technologies?

As RealFusion is a coordination middleware technology and application design model, it shares some common elements with generic middleware technologies, such as process distribution, messaging, data, business logic and deployment which are uniquely implemented through the 'coordination' paradigm which underlies the whole technology.

RealFusion at its foundation is a coordination middleware which is fully decentralised, designed and developed from the ground up to provide a development platform for the production of high-performance, scalable and reliable distributed applications which specifically leverage all the benefits of networked multi-core computing infrastructures.

## When should I use RealFusion?

You should use RealFusion when:

- You have an existing application and want to achieve super-linear scalability
- You are building a transactional application and facing bottlenecks with your database, messaging middleware or XA transaction management
- Your application needs to handle distributed data, while keeping latency down to sub-millisecond performance
- You are building an analytical application that requires near-real-time data processing
- You want to integrate with existing applications, but require the reliability, scalability and performance of a high-end application server
- You expect peak loads and want to be able to scale on demand, avoiding expensive over-provisioning
- Your application is distributed across multiple geographical sites over a WAN and you need to ensure consistency

## How does RealFusion compare to Grid Computing?

The concept of 'Grid Computing' is an umbrella term for a broad range of distributed computing. The definition of Grid computing can be defined as being a form of [distributed computing](#) whereby a "super and virtual computer" is composed of a [cluster](#) of networked, [loosely-coupled](#) computers, acting in concert to perform very large tasks, with 4 major characteristics:

1. Distributed computing
2. Virtualisation of resources
3. Degree of coupling between processors
4. Coordination of activities of processors to perform useful work

RealFusion, whilst sharing these same broad characteristics, also combines the benefits of being a specialised coordination model which is reactive to the current environmental conditions such as available processing, network resources and conditions.

For example where an application is predominantly sequential, most of the time individual threads of execution are potentially busy in blocked states, such as waiting for access to a shared resource. This means that there is limited or no room for parallel processing to occur and therefore the networked / multi-core platform is underutilised. In this case such applications will not leverage the infrastructure to gain performance speed ups even if the application is multi-threaded.

Therefore, for an application to really take advantage of multiple (networked) cores, an application has to be designed, and executed to support high levels of parallelism. This is the foundation of Reactive Coordination and this is the core differentiator between RealFusion and Grid Computing.

## What does RealFusion provide?

RealFusion is an end-to-end solution for scaling the entire business processing chain, through:

**Service-Oriented Architecture:** The development model is designed for building loosely-coupled service architectures using familiar development methodologies and tools.

**Scalability of Service Delivery:** RealFusion provides the ability to handle the demands of modern global enterprise networked applications which must be able to sustain and accommodate high levels of service delivery with respect to unpredictably fluctuating levels of external and internal data traffic.

**Scalability of Performance:** RealFusion provides the ability to scale with the demands for compute-intensive situations such as financial and scientific computations and data processing. With the result that computations are able to scale super-linearly with respect to available processors.

**Middleware-level Virtualisation:** Unlike traditional middleware, RealFusion was designed from the ground-up to operate in a "cloud", because it addresses all aspects of application distribution: messaging, data, business logic and deployment. RealFusion achieves this while making the application look and behave as if it is running on a single server. For instance this allows the use of infrastructure servers for other tasks when their dedicated specific jobs are not running. RealFusion allows for servers to be dynamically reconfigurable to whatever task is required, whenever it is required.

**Reliability:** RealFusion provides the ability to support the ongoing integrity, correctness of data processing in a dynamic distributed computer environment.

**Self-Healing:** Failure of a node in the system -- for example, due to memory shortage -- will result in the automatic re-location of the relevant service or component to an alternate machine

**SLA-Driven:** Application deployment is mapped to appropriate resources based on service-level agreements (SLAs). SLAs definitions may include required system resources, such as CPU, Memory, Operating System type, JVM version and so on

**Multi-Tenancy:** Multiple applications can share the same containers and environment to provide low-latency communications as well as the ability to independently manage each application's life-cycle and SLAs. Applications are isolated from one another, even in cases in which they run on a shared process environment.

**Low-Latency:** Applications using RealFusion benefit from the ability to aggregate communications and local processing in order to provide very low latency interactions between services.

## What does RealFusion provide the analyst/programmer/developer?

RealFusion provides:

1. ease of developing highly distributed enterprise applications which demand high-levels of scalability, performance and reliability
2. ease of integrating existing applications in order to leverage high-levels of scalability, performance and reliability
3. ability to easily leverage in their application the otherwise dormant and inaccessible parallel computing power of current and emerging multi-core technologies.

## How does RealFusion handle integration with Java EE 5, in particular with respect to transactions?

RealFusion provides all of its benefits to existing systems through standard integration methods with both Java Standard Edition (Java-SE) and Java Enterprise Edition (Java-EE).

RealFusion specifically integrates with:

- Apache Tomcat
- JBoss Application Server
- IBM Websphere Application Server V 6.1
- IBM Rational Application Developer
- BEA WebLogic server 10
- BEA WorkShop

To facilitate integration with third-party systems (eg: SAP) RealFusion provides a Java Connector Architecture (JCA) v. 1.5 resource connector.

The connector maintains the integrity of services such as transactions and security across distributed systems, making integration with high-end business systems efficient and safe.

## How does the RealFusion IDE and Management Console Work Together?

The RealFusion IDE and Management Console encompass 3 key concepts:

1. **Birds-Eye-View** - The ability to view the entire environment and interact, as if it was your own desktop. You can develop and unit-test using the Eclipse IDE and then deploy it to the cloud for testing with zero code-changes. In addition the distributed environment in which you deploy and run your code does not affect your business logic or security of existing application domains.
2. **One-Click Granular Deployment** - Once your software is unit-tested and running on your desktop, you can seamlessly transition and scale it on a large number of servers without any configuration, administration or application changes. This is a key concept behind the idea of "pay as you go" in the cloud. With this method whole or parts of applications can be reconfigured as well as new compositions of services created to allow for service scalability.
3. **Scale on demand** - Finally through the Management Console applications can scale on demand which brings together the ability to link on-demand hardware and on-demand scalability, in order to avoid over provisioning which provides a cost-effective scalable infrastructure which enables small and medium vendors to offer service scalability and more performance demanding functionality to their users.

## What differentiates RealFusion from products such as RapidMind?

The RapidMind solution engenders a C++ based Single-Program Multiple Data (SPMD) programming model, where all relevant data types in an existing sequential program, must be converted manually using visual inspection and a high level of understanding of:

- Application requirements, and
- Parallel computing design concepts.

This presents a barrier of time and effort to development, where developers are forced to think 'parallel'. This raises the bar for businesses and developers to adopt this technology.

In order for a developer within a business to be cost effective, efficient and productive they should be able to leverage existing skills and think in terms of what the business needs, and therefore what are the application requirements, rather than get caught in the highly difficult, and inefficient, conundrum of how to parallelise a certain piece of sequential logic, and furthermore how to maintain and debug it.

The advantage to a developer, and hence the business, of RealFusion is that it is a Java based object-oriented programming model, compatible for use with Java Standard Edition and Java Enterprise Edition based systems. This means RealFusion can be used by developers and businesses out of the box, to cost effectively increase the capabilities of applications.

Clients using RealFusion either for integration or developing new systems can immediately leverage existing Java design and development skills and through use of an easy to understand GUI based workflow paradigm for system construction which allows developers to not have to think 'parallel', or even worse how to debug 'parallel'. RealFusion allows developers to think in terms of what the business needs are and what the application needs to do to meet these needs. With RealFusion applications are developed as easily as one would develop a sequential application, the underlying runtime for the application sorts out the "heavy lifting" of how to coordinate the parallel processing. RealFusion provides the ability for all sizes of business to access all the benefits of multi-core computing.

## How does RealFusion differ to GigaSpaces?

GigaSpaces is a collection of products which allow for the production of highly scalable and reliable enterprise applications.

RealFusion differs to GigaSpaces in a number of ways:

1. RealFusion was designed and developed from the ground up to leverage at the application-level current and emerging networked multi-core computing environments, GigaSpaces is not at all.
2. RealFusion makes dormant parallelism easily accessible to developers through the use of an application design paradigm which is based upon well-known Service Oriented Architecture and Workflow concepts.

RealFusion is not a tuple space or shared memory solution like GigaSpaces. The permanent loose coupling model employed by GigaSpaces can give rise to issues of latency and coordination overhead. RealFusion's proprietary coordination model, rather than being inflexible, uses dynamic, reactive coupling of services that provides very low latency and significantly reduced overheads.

4. RealFusion is not bound by the semantics of tuple space generative communications, but provides for the use of Plain Old Java Object (POJO) which allows for pure object-oriented design.
5. RealFusion doesn't mix coordination semantics with business logic or service code.
6. RealFusion run-time is a completely decentralised coordination middleware, with no central rendezvous or control point, unlike GigaSpaces which relies upon a centralised point of control for processing and coupling of services.

## How does RealFusion work with virtual CPU environments?

RealFusion operates in a virtualised CPU environment in the same way as a non-virtualised CPU environment. RealFusion enhances the ability of the application to utilise as many CPU's as are available within its environment.

## How does RealFusion work in multiple CPU environments?

RealFusion enhances the ability of the application to utilise as many CPU's as are available within its environment.

## How does RealFusion work across multiple servers?

RealFusion operates by "knowing" which processors within its environment are available for use and this is not affected by the processors being on different physical servers. RealFusion reduces communications overheads enabling the operation of computations across multiple servers to be faster than other technologies.

## What is the maximum number of CPU's RealFusion can work across?

RealFusion is only limited by the number of processors made available to it within the ICT environment. This number can be set using the RealFusion Management Console.

## How does RealFusion affect application & data security?

RealFusion does not impact or compromise system security, as it operates completely within the security confines of its IT environment.

## Does RealFusion comply with Java Technology Restrictions?

Yes. RealFusion does not create, modify or change the behavior of any or all java, javax or sun packaged class or interfaces.

## How does RealFusion help Green ICT?

By deploying RealFusion businesses can consolidate their server infrastructure and dispense with the need to have dedicated servers for specific applications/functions. This will result in reduction in power consumption, reduced physical footprint, and reduced heat output.

By enabling legacy applications for multiple processors, and being a foundation for the development of multi-threaded applications, RealFusion enables businesses to make the decision to deploy multi-core servers in their environment with the knowledge that they will be able to utilise the full capability of these devices. This will result in lower power consumption, lower heat output and smaller total physical server footprint.

## What performance benefits can RealFusion provide?

A business can greatly increase the speed of processing of current applications and leverage the capabilities of newer hardware technologies like multi-core hardware with these applications, and a business can develop purpose built parallelised applications that are more efficient and inherently capable of leveraging the full power of newer multi-core technologies. This will enable businesses to become "greener" and more efficient.

## Can RealFusion work with multiple platforms?

RealFusion is able to operate in multiple environments and is hardware independent. The current version is optimised for Java SE & EE based applications and the .NET variant is coming soon.

## What has been the RealFusion Testing Strategy in regard to recognised benchmark standards?

ClearFalls has established, and has been pursuing the following strategy for verification and benchmarking its RealFusion product:

- Internal testing - employ standard Java CPU bound bench test algorithms as well as standard Financial system CPU bound bench test algorithms
- External testing - verification of the product in production environments (reference site)

Internal and external tests are performed as an ongoing evolutionary process to ensure the refinement of the overall RealFusion product. Initial testing at the IBM Innovation Centre Australia, included the use of an 8-way processor, in which case there was demonstrated a 13 times speed-up of the respective CPU bound algorithms employed.

Algorithms included:

- Sparse Matrix Multiple
- Crypt
- Monte Carlo
- Ray Tracer

The outcome of these tests have compared positively against the published IBM benchmark results, in that the speed-up results obtained exceeded the published results. Consequently it was established that RealFusion proved to provide better performance characteristics in this configuration.

Following the positive results of these tests, ClearFalls is now proceeding to generate bench tests which are formulated upon more contemporary specifications, such as those provided by SPEC bench tests <http://www.spec.org/>