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High precision in-application instrumentation with minimal performance overhead

In an industry where speed of execution is integral to trading success the ability to detect and consistently refine potential latency sources is fundamental. However, as trading and exchange architectures increasingly consolidate into multi-core servers running client gateways, trading or matching engines, less inter-process communication is happening on the network. Unless developers are able to see inside these processes, they can very quickly become major blind spots.

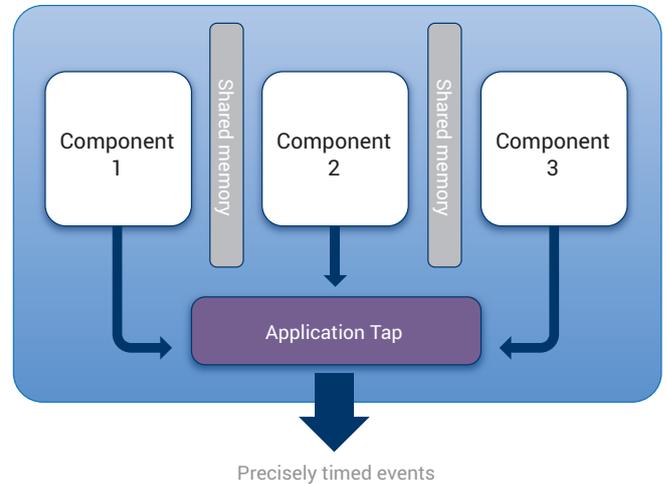
By applying network monitoring techniques at the server's ingress and egress points, users can identify if latency is occurring within the application. But, it is only by instrumenting inside the application that developers are able to gain precise visibility into the inner-processes and pinpoint latency sources between different components, for instance:

- Between two points in the code
- Across network/application boundaries enabling the latency of messages traveling from a point on the network to be correlated with a point in the code, inside the application
- Or vice-versa as messages are then transmitted from the application back onto the network

Having identified which component is causing the delay, developers can then more efficiently allocate engineering effort to the issue's resolution.

Introducing Application Tap: High precision in-application instrumentation

Application Tap offers a patented, high precision approach to in-application instrumentation, with minimal performance overhead. Providing very accurate insight inside application processes, Application Tap offers a fine-grained view of the particular components introducing performance issues, enabling real-time system developers to become significantly more effective in quickly identifying the exact source of potential problems.



Application Tap can be used to instrument different components within a server

With Application Tap users can not only determine which component is causing the delay, but also independently validate whether the latency lies within the application, or by measuring across network boundaries, if the delay actually resides on the network stack or within the operating system.

This ability to gain a hop-by-hop understanding of the performance levels being achieved inside the application and across network/application boundaries would be impossible to comprehend using network only monitoring techniques.

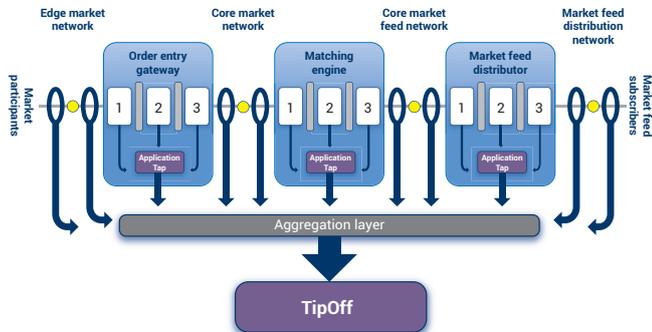
Application Tap enables users to tap into an application and gain a deep, accurate understanding of what is going on, so the problem's source can be isolated, in both testing and production environments. This enables burst and sustained performance throughput rates to be accurately calculated with minimal overhead.

Offering a very lightweight means of accessing data from within application processes, Application Tap also enables firms to achieve many additional goals as the instrumented data can then be fed into other centralised systems where it can be correlated and examined to meet client specific analysis needs



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Application Tap enables instrumented application data to complement network captured data, creating a unified view across the data flow

How it works

Application Tap delivers a view inside systems by placing minimally invasive instrumentation hooks into the application at customisable points of interest. For instance, developers may wish to precisely instrument the time of order matching or when a pre-trade risk check is passed.

With Application Tap developers can signal events by simply using the user mode API to write to the Application Tap memory. When deployed as hardware, Application Tap is able to limit the overhead to a memory write operation avoiding CPU cycles being chewed up unnecessarily on instrumentation.

The code passes the instrumentation metadata to the Application Tap, which time stamps events to 10 nanoseconds resolution, synchronised to PTP, providing a wall clock time. The Application Tap then publishes the instrumented data onto the network, where TipOff or Velocimetrix can recreate a unified, correlated view of the complete stream of network and application data. This is possible even across distributed environments, enabling users to rapidly detect performance issues impacting real-time financial systems and networks, or to feed the data to client specific analysis systems supporting for instance risk or regulatory needs.

Implementation options

Application Tap is a very easy to implement API that enables precisely timed software instrumentation with minimal performance overhead. Developing to Application Tap follows the same process regardless of whether the user wishes to do so in software, where it is most commonly deployed in testing

environments or on hardware where, due to its lightweight approach to instrumentation, it proves very popular in production.

Available for C/C++ and Java, supported on both Linux and Windows, once implemented Application Tap can be then deployed throughout an environment in software or on hardware multiple times. This is possible without the need to actually set up a server with a physical Application Tap for each developer requiring access to perform instrumentation tasks.

Benefits

- High precision application instrumentation
- Application instrumentation with minimal overhead
- Time stamping to 10 nanosecond accuracy
- Instrumentation of up to 64k bytes of messages
- Instrumentation of up to 64 concurrent threads
- Can be applied on a single application or used to achieve a unified view across distributed environments
- Easy to implement API
- Available as a software or hardware assisted solution

About Velocimetrix

Velocimetrix sets a new benchmark for business monitoring and operational oversight by delivering uncompromised end-to-end visibility across complex environments, accompanied by performance improving analytics.

Its full-spectrum product suite, comprising of TipOff, Velocimetrix and Application Tap enables emerging problems to be instantly detected and their root cause rapidly understood from both a business and technical perspective. This significantly reduces an issue's potential impact, whilst also identifying opportunities for on-going performance improvements.

Providing asset class agnostic, highly customisable, agile, open and globally scalable solutions, Velocimetrix prioritises flexibility so it can build the solution that will effectively meet your firm's specific requirements.

Formed in 2009, Velocimetrix' world-class financial services expertise continues to attract a growing global client base. Its sophisticated solutions deliver the level of transparency required to instil confidence and its innovative approach demonstrates the future potential for business flow monitoring and performance analysis tools.

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