It is Orlando, Florida, and a credit card holder makes a routine purchase over the phone. The payment goes through without a query. A few minutes later, the same cardholder attempts to make another purchase. This time, he is trying from Taipei, Taiwan. What does the automated credit approval system do?

What it should do is combine the two events and create a “possible fraud event”. That message will alert the authorisation system and any other systems that need to know. And it will happen so fast that, for the second purchaser, at least, the transaction will be stopped.

But that will probably not happen today. Credit card companies have all kinds of systems for recognising and tracking fraud, but most can only react to a very limited number of events in real time. They don’t have what is being called an ‘event-driven architecture’.

But they soon will have, if the IT analyst group Gartner is correct in its predictions. EDA, says Gartner analyst David McCoy, who cited the above example at the company’s recent annual integration and web services event, is “the next big thing.”

By 2008, he and his fellow analysts think event processing will be mainstream, with most new business systems in large companies set up to emit vast amounts of event information. “Applications are going to start to get very chatty”, says McCoy.

And it is not just applications. Leading thinkers such as Nicholas Negroponte of MIT, and Glover Ferguson, the chief technology officer of Accenture, have forecast that billions of RFID chips, remote sensors, and even a whole world of virtual objects and ‘avatars’ will soon start bombarding their monitoring systems with their latest news.

That kind of information is valuable, but only to those who have set up an IT architecture that is flexible and powerful enough to use it. As ever, the arrival of this new acronym comes with an imperative: those that use EDA will gain important financial and strategic benefits, in terms of agility, shortened process time, simplicity and speed of reaction. The rest will risk obsolescence.

The imminent arrival of the EDA has analyst groups and suppliers scrambling to work out the implications. Gartner has made EDA a central theme in its strategic advice.
A technology primer

Event-driven architecture (EAI) and SOA are mainly ‘pull’ architectures, where applications that require information must request it from a server. With EDA, applications register for certain business events, and are then informed immediately whenever those events occur. (In this sense, the events are ‘pushed’).

This allows applications to react promptly and appropriately to time-critical situations, while using IT resources in the most efficient way. For example, if a shopper has his or her credit card declined by a retailer because a purchase takes it over the limit, the credit card issuer would have an opportunity to raise the credit limit, or negotiate some arrangement to prevent a repetition.

That opportunity is best exploited by striking while the iron is hot – not by waiting a letter that arrives days or weeks later.

A bank equipped with EDA systems could send the customer an email or text message within seconds, perhaps even before the threatened transaction is abandoned. The ability to respond to critical events without delay could easily confer a decisive competitive advantage.

Vivek Ranadivé, the founder of Tibco, suggested a similar idea in his 1999 book The Power of Now. In a section entitled ‘The Event-Driven Revolution’, Ranadivé admits that “although the most complete implementation of the event-driven architecture utilises a real-time software integration infrastructure, any wise business leader can benefit from this winning approach.”

Ranadivé continues: “Being event-driven is also a state of mind: a keen, continuous scanning of the horizon to anticipate events that change the status quo, and then applying event-driven tools to either shape change to the company’s advantage or surf the changes one can’t control in order to be first to the beach.”

Ranadivé contrasts the ‘passive, ‘query me’ client/server technology used in most companies’ with the ‘active’, even somewhat aggressive’ event-driven infrastructure – which he then identifies with publish-subscribe, a paradigm that Tibco pioneered. A similar, but more advanced, idea is complex event processing (CEP), expounded by Stanford professor David Luckham in his book The Power of Events. Luckham argues that vast amounts of valuable information are latent in today’s distributed information systems; a new breed of software tool is...
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needed to collect and present the data. One of Gartner’s first comments about business events came in its ‘Hype cycle for application integration and platform middleware’, published in May 2003. This report places ‘complex event-driven applications’ in the ‘Technology Trigger’ region, to the far left of its well-known hype-cycle diagrams. That means that, in its view, EDA will be increasingly hyped, then will disappoint and disillusion, before finally entering the sun-drenched uplands of the “Plateau of Productivity”. That process will take several years – maybe five to ten.

Gartner analyst Roy Schulte describes CEP as “sophisticated aggregation of multiple events”, and a business event as “a meaningful change in the state of a business or application system”. “Event-driven applications are those in which processing is triggered by the arrival of push-based information coming from outside of the component that performs the function”, he wrote in a recent report. One example: business activity monitoring (BAM) applications, which respond to events reported by the underlying, integrated systems.

There are already more than a three dozen companies involved in pioneering work in this area, with a powerful group of start-ups complimented by established leaders in business intelligence, real-time integration and process management. (For more details, see main article.)

One technology that is expected to spark more use of event-driven systems is RFID – radio frequency ID sensors. These can be used to report back large numbers of events that need a response. Gartner fellow Tom Austin told delegates at a recent US conference that EDA would have to be able to handle the terabytes of data produced by ubiquitous RFID technology.

Although some sceptics may say that they have seen a lot of this before, EDA is different in one key respect: it should be able to monitor large numbers of events – millions, or even billions – and detect so-called ‘complex events’, made up of specified patterns of simple events.

As with many state-of-the-art IT concepts, EDA and CEP have entered the realm of possibility only because of huge advances in processing power, storage capacity and bandwidth availability. In 1990, even the most powerful commercial computers were just not fast enough to carry out all the necessary computation, while networks were too sluggish to deliver a constant stream of messages enterprise-wide.

In a schematic EDA set-up, simple and complex business events are generated by ‘sources’ and immediately detected by ‘event listeners’ programmed to watch for specific events. Whenever an event occurs, it is promptly distributed through a publish/subscribe ‘event channel’, which notifies all those applications (‘handlers’) that registered an interest in that particular type of event. The channel could be implemented using a variety of distributed computing techniques or standards, such as Corba, proprietary message-oriented middleware such as IBM’s WebSphere MQ, Java messaging services (JMS) or web services.
Cover Story

Event-driven architecture

Enterprise integration, says his company’s on-demand operating environment, akin to Gartner’s concept of EDA, “is predicated on the use of SOA as the adaption layer” between business processes and a set of loosely coupled systems services, linked to a complex event processing engine that controls the distribution of these services between the competing processes.

IBM’s CEP engine, presently code-named Whitewater, is set to appear late in 2004. It will provide the last of three capabilities that IBM believes are essential to the realisation of true on-demand or event-driven working.

The first of these, the ability of systems to sense and respond to different stimuli, is already ‘baked into’ IBM’s autonomic computing systems management vision, says Weisser. The second, an adaptive capability that allows systems to respond to changing events based on past experience, is also already embedded within IBM’s early on-demand offerings. The third capability, that Whitewater will empower, will introduce a proactive element to systems behaviour by diluting what Weisser calls the “specificity” that most conventional systems require to respond to events.

At this point says Weisser, the on-demand operating environment is really moving into the realms of the business process layer, providing business users with a way of applying business rules to systems in much less restrictive way.

When will all this happen?

Gartner’s view is that EDA will become part of mainstream systems planning within four years, and will be commonly used in new applications in that timeframe. But, as with SOA and web services, there are huge migratory, architectural and business strategy issues that must be tackled – not all at once, but step by step. “It will take at least 20 years for the notion of EDA to come close to the potential of what can be achieved” concludes Schulte.

The event-driven architecture: A technology primer continued . . .