CONTINUOUS SYSTEM CHECK COULD release data-processing 'brake'

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IN THE INFORMATION AGE data is like the air we breathe. It is consumed in volumes almost too expansive to measure, placing enormous pressure on countless IT systems that have to collect, analyse and process data against immovable deadlines, be they global financial markets or accurate weather forecasts for the nightly news.

The surge in data processing has been paralleled by the development of computer-driven workflow management systems, but until now such systems have mostly monitored and reported. Timeframes have had to accommodate pre-deadline corrections. This need for error fixing comes at the cost of data-processing time and is a brake on data-processing efficiency during a period when the world's thirst for instant, useable information is growing by the minute.

Professor Yun Yang, of Swinburne University of Technology's Centre for Complex Software Systems and Services, has set out to rectify the deficiency. He is developing software that can keep a check on the accuracy of data processing as it is happening, rather than performing time-consuming verification checks afterwards on an entire workflow.

The work is being done with Dr Jinjun Chen and other researchers at the centre in a project partly funded by the Australian Research Council.

Their solution, known as SwinDeW-V, allows for 'checkpoints' to be identified at locations in the workflow where problems have occurred previously, minimising or eliminating the need to run checks across an entire system.

"We've tried to identify where the problems are as early as possible but not waste time checking everywhere because every check you do involves consuming extra resources," Professor Yang explains.

The solution has been tested successfully in a simulated environment and there are numerous applications for such technology in business and commerce, where the volume of transactions needing to be processed accurately presents a constant challenge.

There are also applications in science where computation-intensive tasks must be completed within a specific timeframe, as well as services such as climate and weather forecasting that on the surface may appear routine but are built on vast, constantly changing data feeds.

Key points

The need for error-fixing time costs data-processing time, reducing efficiency

Swinburne has developed software that can check the accuracy of data processing as it is happening, eliminating the need for time-consuming verification checks afterwards

The solution has numerous applications in business, commerce and science

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Professor Yang says the use of a workflow management system such as the Swinburne development could enable meteorologists to make more use of the available high-powered climate modelling systems within the required timeframes.

"My understanding is that even with the computer power they have nowadays, it's probably stretching them to the limit to use the most accurate models for daily, or even weekly, forecasts," he says.

"I know there are much more complicated models which they simply can't use. They have to exercise caution to guarantee a result within a particular timeframe. But with our monitoring system, they can use more complicated models and where there is a problem they can recruit more resources to fix it at an early stage – not afterwards in a verification check. It means we can stretch the limits of data processing and use further."

Use of such a software monitoring system may also lessen the amount of computing processing power that is required to remain in reserve in case of a problem in the workflow, a factor that could lower IT costs.

The Swinburne research team has already formed links with several organisations within private industry, including a company producing insurance-related software.

The team is also planning to work alongside scientists at Swinburne who have to deal with vast amounts of astrophysics data.

Dr Chen, who has been researching the new workflow management software systems at Swinburne, says the new software systems being investigated by the Swinburne team should have a broad application. "In the real world, most processes are constrained by time," he says. "So in principle, the system can be applied to many, many processes."

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