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New Power for Cancer Research from Cloud Computing

- Microsoft Windows Azure



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In the treatment of breast cancer, it is important to be able to assess the likelihood that a primary tumour develops metastases. This is a non-trivial task, as there is an ocean of genes and their combinations that may contribute to the metastasis progression. For the first time, a research team at the University of Helsinki has now utilised the enormous computing capacity of the Windows Azure cloud service with the help of Techila. A computational task that would previously have taken around 15 years can now be completed in less than five days.

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- Sampsa Hautaniemi, docent, University of Helsinki

Breast cancer is the most common cancer type for women. While the prognosis of many subtypes of breast cancers in general is good, certain types of breast cancer pose high risk for metastases, which account for 95 % of the deaths of breast cancer patients. "Breast cancer metastases are the major culprit for mortality in breast cancer. Cells from the primary tumour invade to blood stream and create metastatic tumours elsewhere in the body. The major challenge is that the exact details of this process are not sufficiently well-known. We do not really know how and which cells separate from the tumour and how they behave in the target tissue", describes **Sampsa Hautaniemi**, a docent at the University of Helsinki.

The research team has hundreds of breast cancer tumours available for study. By studying the activity of different genes and combining the data, their aim is to deduce who are highly likely to suffer from metastases. "Currently, many breast cancer patients are treated with aggressive regimens. When we are able to predict which primary tumors are more prone to result metastasis, we can suggest the level of treatment on a more individual basis already at the time of diagnosis", says Hautaniemi.

Fifteen Years of Computation in Less Than Five Days

The greatest challenge the research project faces is finding just the right combination of genes from among 25,000 genes. There is an enormous number of different possibilities, which means that high computational power is required. The computations were now performed using a cloud service, and the results were promising: a computational task that would normally take around 15 years could be completed in four and a half days.

Rainer Wehkamp from Techila, a partner in the research, is pleased that the pilot project specifically concerned cancer research. "I find the subject to be extremely important, as one in four people in the world gets cancer. Although I do not possess the skills to carry out the actual research, it is nice to be able to contribute to it through my own expertise. Our goal was to show the University of Helsinki that high-throughput computing capacity can be easily attained from cloud services with the help of technology developed by Techila. Never before has anyone been able to utilise the Windows Azure cloud service as massively and scalably", recounts Wehkamp.

Computation was performed in a cloud with the help of the autonomic computing technology developed by Techila, using 1,200 processor cores. "Up till now, scientific cloud computing has usually used two or four, at best eight processors. There are a lot of applications also outside universities, as similar computations can be utilised, for example, by insurance companies for risk management. The possibilities are wide open, as the systems in question are global", describes Rainer Wehkamp.

Techila's technology was originally designed to utilise the free computational capacity of desktop computers in companies and universities. "As an example, on the average 95 % of the capacity is wasted at universities. On the other hand, when people are interactively using the computer, the computations must not disturb its normal use in any manner. It was rather easy for Techila to move from such a diverse environment to a cloud environment. As Azure can be purely harnessed for computational use, it has a high utilisation rate of up to 99 %. A researcher who is paying for one hour of computation time, also gets that one hour", Wehkamp promises. "The speed, efficiency and ease of use of the computation are competitive edges in both the research and business worlds."

Research Plans without Limitations

According to Sampsa Hautaniemi, a lot of similar research is being done: "These kinds of pilot projects are important, as computation is a very essential part of modern medical research, and the data sets are growing all the time. The fact that computational resources provided by the cloud service are available, increases prospects to conduct really demanding projects that were not possible few years ago. Previously, we had to limit our research plans due to the inability to perform certain computations."

The results of the research are not yet public, but Hautaniemi is confident that they will attract interest. "The preliminary results included both new findings and previously reported observations that we expected to find. Had we not found them, something would have gone wrong. So, the results make sense, but we still need to validate the new findings", he concludes.



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The Microsoft products and technologies used in the solution:

- Microsoft Windows Azure

Further information

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