beSharp. | enGenome

Unlimited Capacity for the highest performance computing

enGenome is an innovative start-up located in Northern Italy and an accredited spin-off of the University of Pavia. It provides **software for the analysis and the interpretation of the DNA** sequencing data in clinical and research settings in order to provide accurate omics-based reports and to improve medical diagnosis and treatment. enGenome engaged beSharp as an AWS Advanced Consulting partner to give birth to **eVai**, a new, efficient and scalable platform for the bioinformatics and genomic **analysis of data.**

THE CHALLENGE

- Replace the existing monolithic AWS infrastructure with a more **agile**, **high available** and **scalable** one, capable of managing all the conceivable workloads.

- **Enforce data protection** and backup policies in order to keep all the sensitive data safe from corruption and unintended modification.

- Leverage the AWS services in order to make the HPC flows **resilient to the failure** of one or more steps.

THE SOLUTION

- A **stateless architecture** based on multiple EC2 instances automatically configured using **AWS CloudFormation** and **AWS Systems Manager**. The HPC grid engine cluster was made scalable using an advanced configuration of **AWS Auto Scaling**, leveraging auto scaling **lifecycle hooks**, custom **AWS Cloudwatch metrics**, **AWS Lambda Functions** and **AWS Systems Manager.**

- Implementation of a **data lake** using Amazon S3 as the date storage in order to take advantage of its data protection and replication features. Moreover, an automatic **backup and DR system** was implemented in order to save data also in different AWS regions.

- Implementation of an **advanced HPC workflow** using **Amazon SQS** queues, **AWS Lambda Functions** and **SSM** to deliver jobs to the HPC cluster.

Scalability

Advanced **auto scaling rules** make it possible to launch and configure Spot EC2 instances fleets to support any workload, significantly improving genomics analysis processing speed.

Efficiency

Thanks to the switch from a monolithic, stateful architecture to a stateless infrastructure based on on-demand and spot EC2 instances, a managed RDS database and S3 for scalable data storage, eVai could benefit from great **performance improvement**, doubling jobs completed per day.

Data and security

enGenome took advantage of **Amazon S3 durability**, **availability** and **redundancy**. Moreover it also heavily leveraged Amazon S3 features like **Lifecycle Hook** to move older data to a different class of storage (Amazon Glacier) and **File Versioning** to keep track of all the data changes. An automatic backup and DR system was also implemented in order to **save data in different AWS regions**, too.
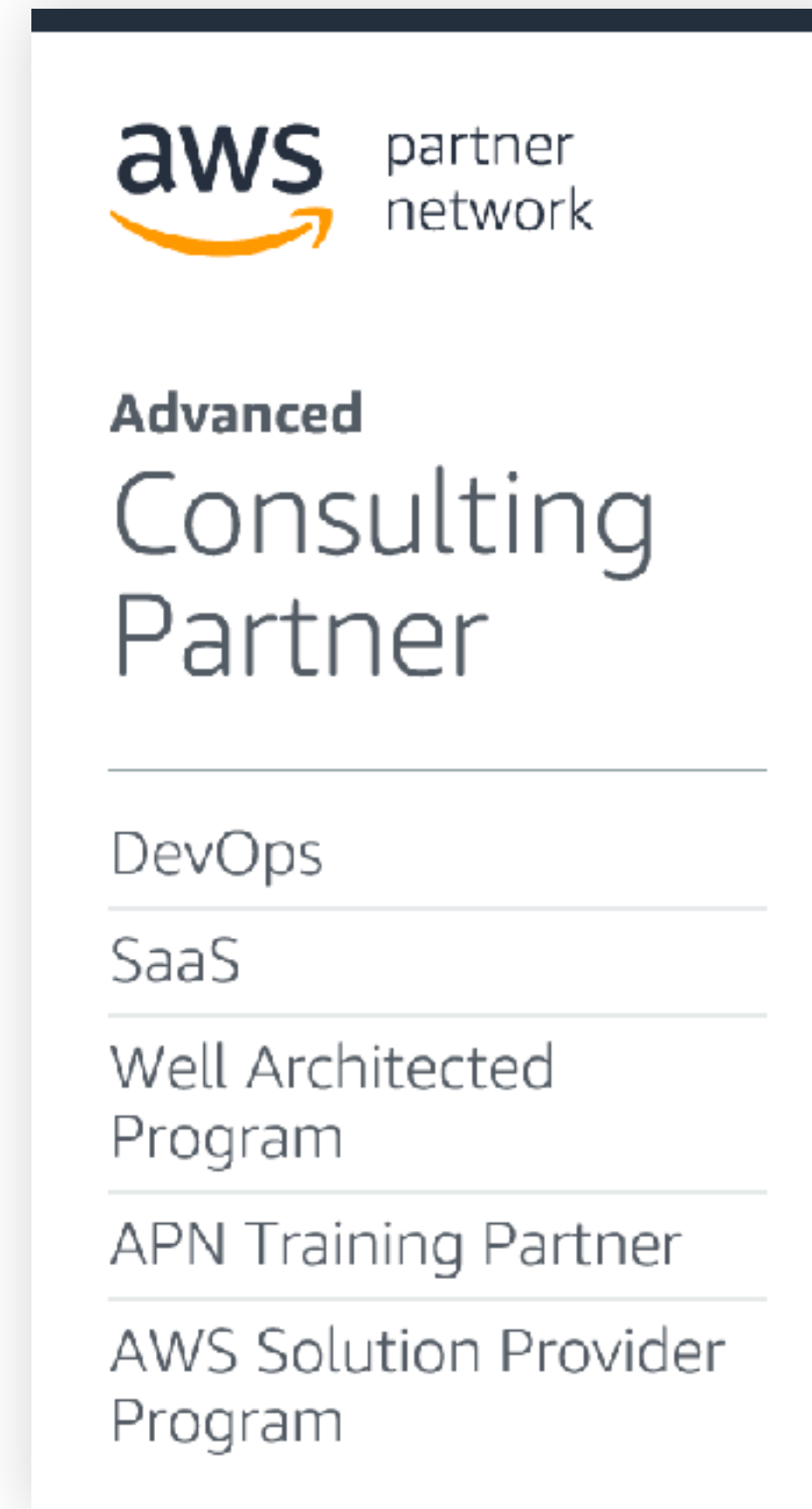
ABOUT BESHARP

beSharp is a longstanding **AWS Advanced Consulting Partner**, with a deep expertise in designing, implementing, and managing Cloud infrastructures and services, **focusing exclusively on AWS.**

As **one of the very few SaaS Competency Partner in the World**, beSharp has a recognized experience in building Cloud-native applications on AWS.

Thanks to its certified Cloud Expert team, beSharp provides **24/7 support and managed services** for global scale Cloud infrastructures on AWS.

Since 2011, beSharp has contributed to thousands of Cloud projects for the most prestigious companies all around the world, Pirelli, General Electric and the United Nations World Food Programme among the others.

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www.besharp.it
info@besharp.it
+39 0382 1692920

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