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In situ processing of medical imaging data

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In the context of the CHAIMELEON project (<https://chaimoleon.eu/>) we have developed a secure processing environment to manage medical imaging data and their associated clinical data enabling researchers to share, publish, process and trace datasets in virtual environments, powered by intensive computing resources.

The environment is built on top of a Kubernetes cluster and leverages native objects such as namespaces, policies, service accounts and role based access mechanisms to define read-only views of the medical data, mounted on GUI-based virtual research environments in which the data is accessible without the possibility of downloading it outside of the platform borders. Additional functionality is implemented through custom resources and operators. Coarse actions such as dataset creation, dataset access or dataset updates are auditable and registered on a blockchain that the data holder who provide the data can consult.

Processing environments are powered by a set of partitions that act as job queues providing different flavours in terms of GPU, memory and cores. These resources are managed through a special component that facilitates the execution of containerised batch jobs, including the support of uDocker for custom containers.

The environment has been validated in the course of a public Open Challenge in which 10 users compete to train the most accurate AI models for addressing two cancer-oriented use cases.

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