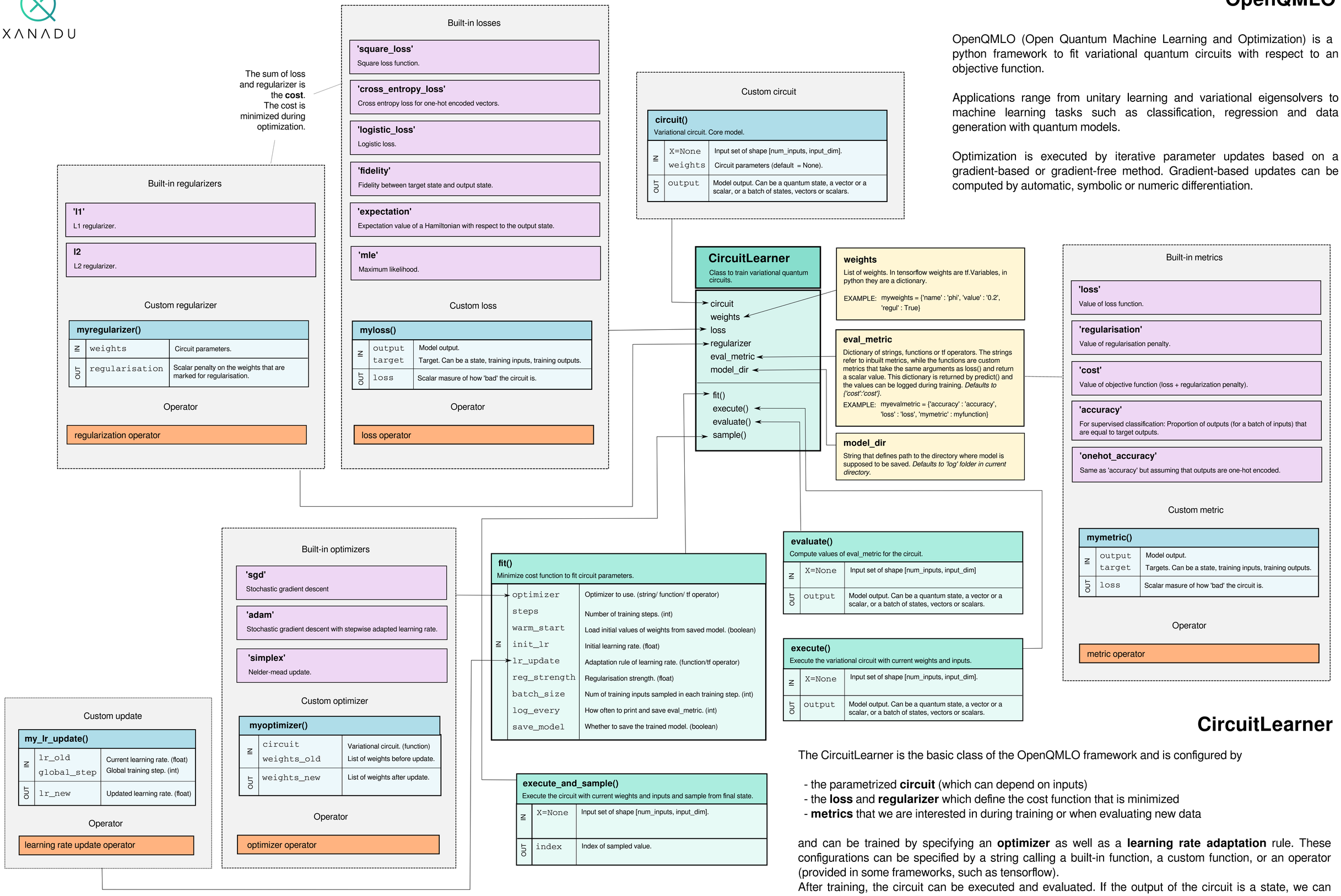
XANADU

OpenQMLO

OpenQMLO (Open Quantum Machine Learning and Optimization) is a python framework to fit variational quantum circuits with respect to an objective function.

Applications range from unitary learning and variational eigensolvers to machine learning tasks such as classification, regression and data generation with quantum models.

Optimization is executed by iterative parameter updates based on a gradient-based or gradient-free method. Gradient-based updates can be computed by automatic, symbolic or numeric differentiation.



CircuitLearner

The CircuitLearner is the basic class of the OpenQMLO framework and is configured by

- the parametrized **circuit** (which can depend on inputs)
- the **loss** and **regularizer** which define the cost function that is minimized
- **metrics** that we are interested in during training or when evaluating new data

and can be trained by specifying an **optimizer** as well as a **learning rate adaptation** rule. These configurations can be specified by a string calling a built-in function, a custom function, or an operator (provided in some frameworks, such as tensorflow).
After training, the circuit can be executed and evaluated. If the output of the circuit is a state, we can sample from the state. The learner class takes care of performing the optimization steps (if applicable, on batches of data), of saving and restoring parameters, of parallelization and visualisation of the training.