

Define Architecture	Architectural Overview	Frontend	Control room machines away from offshore refineries
		Backend 1	Server at remote location
		Backend 2	Server at control room that will be used to analyze the time series data.
		Database	Time series database hosted on Control room
		APIs	Communication of the frames and analyzed motion points
	Key Technologies	Frontend	Grafana
		Backend 1	Python, OpenCV, Numpy
		Backend 2	Python, ML libraries like tensorflow, scikitlearn
		Database	PostGres Time Series
		APIs	gRPC
		Operating system	Linux
		Communication	Ethernet for video frames on refinery, gRPC for control room
Stake Holders	Users	Regular users	Personell at control room, personell at refinery (if any)
		Admin users	Control room.
	Business stakeholders	Refinery managers	Managers of refinery, quality control, predictive maintainence team manager
		Refinery owners	Owners of the refinery (usually government agencies)
	Predictive maintainence team	Repair personell	Personell who are going to repair any wear and tear.
Quality Parameters	Scalability	Frontend	High scalable - alerts are sent to subscribers. They can be any devices including mobile devices. Data is pushed into database. More subscribers can be added from the database.
		Backend 1	High scalable (new camera sensor can be easily added)
		Backend 2	High scalable since there is a centralized database that can be accessed.
		Database	High scalable due to use of gRPC. New database server can be added easily.
	Performance	Frontend	High performance since it has to render the visualization of data
		Backend 1	Low performance since the algorithm is slow. It will act as bottleneck
		Backend 2	High performance since it does not work in realtime
		Database	Moderate performance since it has to cater to realtime communication.
		APIs	Improvement of performance since only motion points are transfered. If the frames are tranasfered then the performance will go down
	Security	Frontend	Less secure since there are many that will access the frontend.
		Backend 1	Most secure due to use of ethernet and data transfer to limited servers
		Backend 2	Secured by controlled access
		Database	Less secure since there are many that will access the database.
		APIs	Less secure since there are many that will access the APIs.
	Availability	Frontend	High availability
		Backend 1	High availability
		Backend 2	High availability
		Database	Moderate availability due to load of realtime environment

		APIs	High availability
Analysis	Architectural decisions	Frontend	Front end is kept at control room in order to able to visualize it without need of maintaining a personell at remote refineries
		Backend 1	Backend server will run in offshore refinery. It will process all sensor data and give the output points. It will also run basic forms of alerts. When the amplitude and frequency goes beyonbd a certain threshold, it will raise alert. In case of any failure, it will send the entire video stream. This is done in order to reduce cost of communication of all frames and latency. Moreover any personell present in the offshore refinery can also monitor the system.
		Backend 2	This server will perform analysis like timeseries forecasting, analysis and prediction.
		Database	Time series database consisting of motion points. Timeseries database is chosen because of the nature of the data.
		APIs	API to transfer alerts, motion points
	Scenerios	Regular functioning	Motion points analyzed and stored in database. Regular operation
		Severe System damage	Backend 1 will give alert to personell at refinery and at control room
		Irregular vibrations	Backend 2 will give alert to control room after through frequency analysis.
		Wear and tear	Backend 2 will analyze long term changes and will give alert