# Architectural approaches (patterns, tactics, reference architectures etc.) used.

The team has used Micro services architectural pattern to provide the solution.

**Micro services:**

* Increased Development Time
* Performance Decrease

**Key Quality Attributes:**

* Availability
* Performance
* Security
* Usability

## Identification of Architectural Approach

1. Reference Architecture is a micro services architecture and presented in Layered based system. The different types of services are implemented and shown in the respective layers
2. Design pattern is Micro services based architecture (to justify Availability and Performance)
3. Divide functionality into multiple services hosted into multiple hosting points
4. Provide a security service (OTIS gateway) in order to protect data from malicious attacks
5. Get all Data from external systems and dump in 2 databases: User information, Report within 15 minutes and make prebuild data to show user information when needed.
6. Customer Middleware service to get data from external system and store them in multiple databases using the business layer

## Tactics:

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| --- | --- | --- | --- |
| **SR No** | **Tactic** | **QA tactics** | **Module/component plan to implement** |
| 1 | Exception handling | Availability | Logger Service |
| 2 | Removal from service | Availability | OTIS gateway |
| 3 | Heart beat | Availability | Data Layer |
| 4 | Increase Available resources | Performance | Business services |
| 5 | Caching of Data | Performance | Business Layer |
| 6 | Detect attacks and resist | Security | OTIS gateway |
| 7 | Separate User Interface | Usability | User service |

## Risk and Non-risks

### Risks:

|  |  |
| --- | --- |
| **Risk ID** | **Description** |
| R1 | No solution written for providing API endpoints for external systems is missing, which is a risk for Availability |
| R2 | Services while communicating with one another is through end-points which is not encrypted/secured. |
| R3 | No backups of databases are defined in the system which causes a risk in availability if database connection fails |
| R4 | System needs to be deliver within 6 months. Considering OTIS portfolio, the implementation of micro services is not causes overhead for lower number of users. |
| R5 | Customer Middleware service is critical to get data from external system, failure in the service which cause |
| R6 | OTIS gateway failure can cause the system to be inaccessible for the users of the system. |

### Non-Risks:

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| --- | --- |
| **Non-Risk Id** | **Description** |
| NR1 | Stack Overflow attacks and Code Injections are handled. Alter will be generated to the system Admins if store issue occurs. |
| NR2 | Malicious logging attempts and Spam IP blocking is done which improves security. To many logging attempts will trigger an alert to the system admin and system block the malicious IP address |
| NR3 | Data Caching approach will improve the Performance of the system |
| NR4 | Providing logging service as separate service to provide availability to the system |
| NR5 | Important logs of the system are encrypted to handle the security threats |
| NR6 | Notification service is added into the system whose availability is critical in provides error, security and alter notification to respective stakeholders. By separating it, maintenance of the service will be easy |

## Risk Themes:

Team review the quality aspects and the identified risks, non-risks of the system. The following the risk themes identified from the inputs mentioned above:

* The implementation micro services architecture will be challenging for the current team and external hires to develop in such short amount of time. Service Oriented architecture is difficult and complex to implement and overall system testing is difficult.
* Adding additional security to the system will impact the usability and performance of the system. Dividing work into multiple service will yield additional latency which will impact performance.
* OTIS system is relatively small and having multiple databases will add additional time for querying data from multiple services. Different types of databases will add complexity to the system as different maintenance and learning overheads will occur

## Sensitivity Points:

* No backup exits for databases of services for User information Database and report database
* Data Layer is sensitive point as all user and report information is stored in the system. Querying one database with other will impact the security aspect.
* No Databases backup tactic is provided which makes data layer as sensitive
* OTIS Gateway Service is critical for entire system. The service communicates with the external system will fetch the data and deliver the data to respective business objects
* Customer middleware service is critical for the customers as the entire service will differentiate the data coming from different sources.

## Trade Offs:

1. How much security level is intended in Gateway service, as more security tactics will eventually impact Performance?

2. Additional micro services added to increase Availability will impact Performance due to increased communication overhead between system components

3. Added security will impact Usability from User perspective.

4. The importance of data and data change frequency determines which data would be beneficial to cache. As cache takes up additional storage in the system, micro services load could impact the extra overhead of space and caching computation every time external system provides data in the system.

## Evaluation Opinion/Comments:

We consider this system to be more suited monolithic pattern/architecture as concern of less cost and time dependency (6 months).

Usability tactic is prioritized QA as there are no mentioned tactics to address usability.

Micro services have issue with the testing and validation of the system and prolonged issue in the system is a concern of availability.

Caching of the system is good for performance and availability but caching all system data will add extra computational overhead to update the cached data every time data changes occur.

Micro services are better in large scale applications. Our User base and application is relatively small so additional cost of resources (Time, budget, human resources) are required to implement the system in this architecture. [1]

## Questions:

* If user want to see the tracking progress of the order. Does your system provide the functionality for that?
* Considering Security as key QA, 1 hour response time for Malicious Attempt seems much prolonged, should be in a few minutes.
* Why Micro services? Does this system require the scalability of micro services as this system has less clients and more data to handle from external system.
* Usability is mentioned in the system what tactics are used by you as there is no tactic mentioned in the document.
* Restful services for external client not used why
* No Databases backup plan is incorporated with the OTIS system
* Report Update Service is unclear, how this will work and what kind of Report Update is intended by User Account Service?
* How much data will be cached in the system

# References

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| --- | --- |
| [1] | magello, "Microservices — Good or Bad?," magello, 13 Janurary 2018. [Online]. Available: https://magello.se/microservices-good-or-bad/. |
| [2] | J. Nemer, "Advantages and Disadvantages of Microservices Architecture," 13 November 2019. [Online]. Available: https://cloudacademy.com/blog/microservices-architecture-challenge-advantage-drawback/. |