

1 Human Access Channels

Users will access the P.A.P.E.R.S system through a website front-end on a web server maintained by the Computer Science department. The website can be access off campus through any browser, i.e. Chrome, Mozilla Firefox, Internet Explorer, Safari and Edge. When on the website, the user will have to log in and depending on what user privilege the user has (lecturer, research leader, HOD) the user will access a different user interface, modelled to what the particular user is allowed to access. The website will be under strict standards-compliance that is having the website comply with the World Wide Web Consortium (W3C) (W3C, 2016) so that the website will run on every browser exactly the same. Users can also access the P.A.P.E.R.S system through an android application that uses the same web server as a back-end. The Android system can be used as a replacement for the website and vice versa. It should be able to work on mobile phones or tablets that supports the Android operating system.

2 Integration channels

2.1 LDAP

LDAP (Lightweight Directory Access Protocol), is an Internet protocol that email and other programs use to look up information on a server (Gracion Software, 2016). In the case of the P.A.P.E.R.S system LDAP can be used in particular to storing and retrieving user information stored in the database, such as the user's publications and particulars. The LDAP protocol runs a layer above the TCP/IP layer and provides the mechanisms to connect to, search, and modify Internet directories, such is found in the P.A.P.E.R.S system (Microsoft, 2016). LDAP supports C and C++ programming languages. The aforementioned database will be the main backbone of the system and thus will include quality requirements:

- Performance: Accessing data from the database needs to happen as fast as possible. This means an equally fast protocol needs to be used to be used. Since the website and Android application can be run and used offsite from the University of Pretoria, SCP will be used to quickly move around data. FTP could have been used, but it is not as secure as SCP which uses the SSH protocol for authentication (LiquidWeb,

2016). SFTP (a more secure version of FTP) could also be used but because speed is an issue, SCP will be used instead as it is faster (LiquidWeb, 2016).

- Reliability: The system should not have downtime and thus should have a secure and reliable connection to the LDAP system.
- Scalability: The database must be able to store and manage a large amount of entries that include relationships to all entities such as users, publications, authors, etc.
- Auditability: Any change to the system through LDAP and SCP should be logged in a log file. This includes what queries were made, who made them, what time and a trace of the actions performed.
- Flexibility: This should be shown in the database as it being in a state where any change done to the database should not in any way affect the system as a whole. This requires a high level of normalisation in the database to prevent any data anomalies that could occur from using the system.
- Affordability: Any request made by the LDAP system, made by the user, should not affect the performance of the system as a whole and should be affordable in a sense to not prevent any other user concurrently using the system from not being able to perform their actions optimally.

2.2 HTTPS

HTTP will be used for the web services and in particular HTTPS will be used to make the system more secure. The reason being is that traffic sent over HTTP is highly confidential (user's usernames and passwords) and thus need to be protected. As the whole web based approach will require the HTTPS protocol, it would need quality requirements:

- Performance: the actual difference in speed compared to a normal HTTP is insignificant, in fact even a little bit faster (see annex A) but can take longer in regards to the SSL handshake request that has to be made. This is still something that can be overlooked as security has a higher priority than speed.

- Reliability: Since HTTPS is not reliable enough in itself as a connection is never maintained. Thus TCP in conjunction with HTTPS can be used. This will allow you to wait for responses that could inform you if the server has received all the information.
- Scalability: HTTPS must be able to handle many requests sent and received and not slow down the system as a whole when doing so.
- Auditability: Every HTTPS request needs to be logged in an appropriate log file to see what has been requested

2.3 SMTP

SMTP (Simple Mail Transfer Protocol) will be used to send email notifications to users of the system. This falls under the notification domain of the system and will be linked to the deadlines set by users in the database. SMTP uses Port 25 to send emails but Port 465 can be used instead if encryption needs to be used to send emails securely (SiteGround, 2016).

2.4 Other Integration Channels

- Javascript/Jquery could be used on the front end to provide a more user friendly and interactive system and to prevent any unauthorised changes to the system. Bootstrap can work on the front end to help maintain a common and consistent user interface.
- JPA (Java Persistence API) is Java specification for accessing, persisting, and managing data in a Java based database that is what is chosen to work on the back-end.
- SQL (Structured Query language) can be used if a relational database is used in the place of a java based database. noSQL can thus be used if the database is non relational

3 References

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