Modernising the Fontes Database

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Abstract
The Fontes database maps relationships between Anglo-Saxon texts and their sources. However, with the web version taken down in 2018 and the remaining offline version being over 20 years old, the Fontes database is in dire need of modernisation so that it can be put in the public domain once more.

This project aims to modernise the Fontes database and redesign the web user interface to be in line with modern standards. An iterative approach based on how users use the system will be adopted. This report primarily documents the process of design and implementation of the new Fontes website.
Acknowledgements

I would like to thank Dr Mark-Jan Nederhof for the advice and support he has given me as a supervisor during this project. I would also like to thank Dr Christine Rauer for the opportunity to work on Fontes. Both of their contributions of feedback to the design process were invaluable, especially in the current circumstances.
Declaration

I declare that the material submitted for assessment is my own work except where credit is explicitly given to others by citation or acknowledgement. This work was performed during the current academic year except where otherwise stated.

The main text of this project report is 12,457 words long, including project specification and plan.

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Appendix 3. Transcription of WAAD

Search A-S -> Source: Top, First from Left

Search Source -> A-S Author: Top, Second from Left

Bibliography: Top, Third from Left

Search Author Reference Summary

Web

Appendix 4. Transcription of Desired Features

Start

Search
1. Introduction

Background

During the early growth of the internet, many academic resources were made to be shared amongst each other. However, since then, many have been left as they were originally designed. While still functional, they are visually and functionally reminders of a previous era in design and web implementation.

The Fontes database was one such resource. The database’s main purpose is storing relationships between Anglo-Saxon texts and their sources via quotes in text and assigning a classification on the certainty and type of relationships experts think is appropriate.

While the database still exists as a standalone application, it previously also had a website which was maintained by the University of Oxford (Fontes Anglo-Saxonici, 2019). However, that version was taken down after the end-of-life of the supporting technology. Although the standalone version is still available, it faces its own host of problems such as also being dated and being difficult to get running on non-Windows machines due to the use of an old version of MS Access.

Importance of The Project

The Fontes database as an academic resource is not insignificant. The list in Appendix 2 shows a number of books which cited the database. The database also has significance to academics in the field of source study. In the context of Fontes, this field (also known as source criticism) looks at the validity or reliability of sources given a passage in an Anglo-Saxon text. Furthermore, the Fontes database is a valuable resource for anyone interested in looking at Anglo-Saxon texts in the context of the literature of their time.

Finally, apart from the value of the information which would be lost if Fontes is left ignored, the money and effort in creating the resource would also be rendered null. The old Fontes website acknowledges the years of continual additions of database entries and the grants provided by numerous institutions (Fontes Anglo-Saxonici, 2019) which would be wasted if the database ends up forgotten.

Problem Definition and Goals

Although the simple solution to the Fontes website being down is to port the data into a newer database and continue running the same operation, it does not seem to be a good long-term solution. Web standards and implementation has now progressed to a point where practices of 20 years ago are now considered deprecated.

The problem this project aims to solve is to modernise the Fontes database, redesign and implement the UI (user interface) to be more in line with modern practices for Fontes on the web. The core goals of the project can be summarised with these 3 points:

1. Port the data into a modern database system
2. Design the web UI for modern standards
3. Implement the designed UI with the core functionality of the Fontes database
   - Search by Anglo-Saxon text
   - Search by Source text
   - Showing results

As the results of the project may be publicly hosted on completion, the core goals of the project must be completed fully to be considered successful as they serve as the bare minimum
functionality that the Fontes database provides. The order of the core goals also serves as their priority ranking.

A set of secondary goals were also created to guide the project should the core goals be met. These are as follows:

- Implementing the non-core functionality of the Fontes database
- Designing further features which could be implemented in a future project

However, it should be noted that these goals were set prior to the design process and are guidelines rather than rules. Furthermore, the secondary goals are intentionally vague as the scope of the project was not fully defined at the beginning, but iteratively refined via the design process.

Document Structure

This report contains 7 chapters including the introduction. The 7 chapters are as follows:

1. Introduction – Provides background and highlights why the project is worth doing
2. Context Survey – Recounts Fontes’ beginnings, conducts a review on similar projects and discusses helpful concepts for the design process
3. Ethics – Discusses the ethical considerations of this project
4. Design Process – A detailed look in the process used in this project and reasons behind certain design decisions
5. Implementation – Description of final changes in design when faced with implementation and key or unique features which were non-trivial to implement. Additionally, explanations on why certain aspects of the implementation were done the way they were
6. Evaluation and Critical Analysis – A comparison between the final product and the initial goals of the project
7. Conclusion – Summary of the project and potential further work going forwards
2. Context Survey

This section provides historical context to the Fontes project, compares similar works to the current project, discusses some useful concepts regarding the design process and looks at how the original Fontes database functions.

Historical Context

In medieval times, authors would translate texts into their own language or write of historical events based on other sources. However, unlike today, it was rare that they acknowledged their sources. The Fontes database was originally created to solve this problem by mapping Anglo-Saxon passages to what experts in the field considered their source texts.

According to the old Fontes website, the idea for the Fontes database was conceived in 1984 and was initially hosted on a mainframe at the University of Manchester (Fontes Anglo-Saxonici - Introduction, 2001). However, over the years, the data has been routinely updated both in data as well as the hardware and software supporting the database. Unfortunately, as of December 2018, the database was taken down by the University of Oxford as the supporting technology had reached their end-of-life. With this, St Andrews has been chosen as the next university to host the Fontes database next.

Although niche, the Fontes database has been useful to scholars since its conception, especially those involved in the field of source study. In a briefing with one of the contributing members of Fontes, Dr Christine Rauer, she mentioned that the Fontes database has been used by many academics across the world. Furthermore, she also mentioned that the Fontes database had been previously used in the University of St Andrews’ School of English in research papers.

Similar Works

People of Medieval Scotland
https://www.poms.ac.uk/

The People of Medieval Scotland database stores information on individuals mentioned in documents from 1093 to 1371 (Beam, et al., n.d.). Notably, they also record the relationships between the individuals in the database if possible.

The resource is very modern and provides a number of ways to sift through and explore the information. Apart from the standard search functionality, they also provide:

- A network view representing the relationships between individuals
- A map view showing where records are placed according to location
- Various set “tag categories” which results can be quickly narrowed

Furthermore, the database, which is hosted by King’s College London, is exemplary model of bringing history and technology together with modern standards of usability. As an academic resource, they offer easy methods of citing the documents of the resource and provide results in a logical, clean and clear way.

Although the difference in theme between this resource and the Fontes database is evident, it is clear that there are similarities as well as potential benefits from considering this resource as a potential source of inspiration.

The Medieval Bestiary
http://www.bestiary.ca/
The Medieval Bestiary provides access to medieval interpretations of animals according to contemporary sources. Medieval depictions of animals often went along with stories or analogies which meant that they had distinct meaning for those of the society at the time. Even for those who could not read, manuscripts were often illustrated so the illiterate could also recall the meaning (Badke, 2011). This resource allows modern academics to gain insight into western medieval society through the study of medieval imagery and assigned meanings to animals.

While the resource has not been updated since 2011, the site appears to have been mapped out consistently. The data is sectioned off into logical categories and there are helper links within those pages to jump to sections the user is interested in. Also, on each result page, reference to the sources’ authors are made which allows scholars to perform their own checks on the information.

This website is of interest because it is similar to the Fontes database in essence. This is providing static content in a database in a web resource. It is also a resource which brings technology and medieval history together. However, although fully functional, its appearance has fallen out of favour with the times. A quick look at the HTML code further supports this. This suggests that the redesign and implementation of the Fontes database should attempt to adhere to modern standards as much as possible to try and ensure its longevity.

Bosworth-Toller Anglo-Saxon Dictionary
http://bosworth.ff.cuni.cz/

As the name states, it is a dictionary for translating Old English into modern English. The dictionary was digitised in 2001 based on the 1898 work of Joseph Bosworth and T. Northcote Toller (Crist, Tichý, Hejná, Filipová, & Gillová, 2020).

The resource allows the search of Old English words or by narrowing the search results by alphabet. On each result page, the meaning of the word is given as well as places in the manuscript where the word appears along with an excerpt. Furthermore, the advanced search option allows a much more precise search. However, it appears that being unfamiliar with Old English might hinder the user as the search is very much based around Old English.

As a resource, the presentation is clean and clear. However, it appears that the dictionary fulfils a niche, much like the Fontes database. On trying out the website, one thing that strikes me is that a deep understanding of the user’s requirements should be gained before designing the Fontes database. Such understanding would aid decisions on how much pre-requisite knowledge should be necessary to use the resource created.

Useful Concepts

The main part of this project is to make the Fontes database accessible once again. However, in the last 20 years, web design has changed dramatically. What was standard before is now seen as outdated. As such, one of the primary goals of this project is to create a web interface which matches modern standards. One such process of creating suitable end product is User-Centred Interaction design.

User-Centred Interaction design (Hartson & Pyla, 2012) is an iterative process which is based on observing the user’s workflow rather than guessing what they need. Designers may accurately identify the necessary functions the product should have, but they may assign priorities to the functions incorrectly and create a user experience which falls short of expectations. As the name suggests, the end product should be based firmly around the needs of the user. The main steps in this process are:
• Identification of key workflows through context inquiries and analysis
• Analysis of usage scenarios
• Iteration with low-fidelity prototypes with main functionality
• Iteration with high-fidelity prototypes with regards to the whole design

Using the Fontes CD-ROM Version

As the only Fontes system currently publicly available¹, the standalone Fontes application will serve as the basis for the creation of the new system. As such, understanding how the old system works is essential, especially with regards to domain specific terms and ideas. This section gives a brief overview on the key features of the system.

Notes on Terminology

Initially, the Fontes database used the terms “Anglo-Saxon” texts and “Source” texts to describe the categories of texts in the database. However, the terms are highly ambiguous in the context of this database as an “Anglo-Saxon” text is classified as any text written in Anglo-Saxon territory and a “Source” text is any text which is used in an “Anglo-Saxon” text. This means that a text could be both an “Anglo-Saxon” text and a “Source” text. As a result, the terms “Target” for “Anglo-Saxon” and “Source” will be used in later chapters about the design and implementation.

Anglo-Saxon & Source Search

![Diagram of Anglo-Saxon & Source Search](image)

Figure 1. General process of searching in the standalone Fontes version

The main search function of the Fontes database is to search for source texts when the “Anglo-Saxon” text is known or vice versa. Figure 1 illustrates the general process of searching. It should be noted that the two searches are distinct and must be swapped by clicking the buttons at the top of figure 2. Although the two searches are separate, they function the same way so only one search will be examined.

¹ Available at Oxford University Research Archive (https://ora.ox.ac.uk/objects/uuid:1979a597-b4bf-4790-966d-e207d725af9d)
Once a text has been selected, the button in the bottom-left (marked by a red box) must be clicked to see all sources for an “Anglo-Saxon” text. Figure 3 shows how the entries are shown given an “Anglo-Saxon” text. Most importantly is the information displayed in the box below the list of entries.
Bibliography Search

The bibliography search allows the user to find additional details of publications should they wish to locate the book. Although the author, title and edition can be found in the main search, this section provides more information like page numbers to look for.

Author Reference Summary

The author reference summary provides an alternative way to search the database. The user starts by selecting an author from the top-right or top-left lists. All texts written by that author which are of the same category (Anglo-Saxon or source) will then be listed in the top-middle box. The bottom box will then be populated by “Source” or “Anglo-Saxon” texts depending on what type of text was initially selected. The user can then proceed to see the entries of the books using the buttons at the bottom marked in red depending on what kind of text is selected.
3. Ethics

As the current Fontes project is just a redesign and implementation of the web user interface, there should be no ethical considerations concerning the implementation process. Although the design process is improved by more data, the situation surrounding COVID-19 and being unable to acquire the appropriate level of ethic approval during the design stage caused the design process to bypass this. This is because the blanket ethical approval only covers internal members of the University of St Andrews. Even then, any questions which would have been on the questionnaire would have been anonymous and non-personal, meaning that the project would not have used or stored sensitive data.

In the end, the blanket ethics form was used in case testing on students happened. A copy of the ethics self-assessment form can be found in Appendix 11.
4. Design Process

This section covers how the final design evolved from the concept stage. Each stage is separated into their logical grouping but the whole process was more iterative with multiple small changes rather than one radical shift between stages. Additionally, key features and driving design decisions are discussed.

System Concept Statement

According to Hartson and Pyla, the system concept statement provides a vision and sets the scope for the project for the development team as well as serving as an explanation of the project for outsiders.

Statement

The Fontes database web redesign is to replace the previous web resource which was taken down. The new resource will allow scholars of Medieval English and other historical texts to easily find references from Anglo-Saxon texts to their source material. This redesign aims to modernise the front-end so that information can be found efficiently and the back-end so the resource is easy to maintain.

The new Fontes website will focus on usability first and aim to support academics as a priority. Furthermore, the redesign will seek to reach an appropriate level of professionalism as it is likely to be hosted on university servers. The goal is to provide the users with a seamless and painless experience so they would be happy to use the resource again.

Context Inquiry & Analysis

The context inquiry and analysis section looks at collecting data on how users interact with the system. The aim is to generate an overview on what parts of the user workflow can be improved. This stage normally results in diagrams giving an overview of the process and a WAAD (work activity affinity diagram). These can then be used to extract design requirements.

Context Inquiry

Due to the circumstances of the old Fontes website and COVID-19, changes to the initial data collection plan was necessary. Typically, data gathering at this stage would require observing the user while they use the system. This is because users of a system may be so used to the system that they skip over processes they deem obvious, even if it is not obvious to outsiders of the system. Furthermore, users may have developed their own practices to make up for the shortcomings of the system.

Fortunately, this was easily changed to an online session where the client, Dr Christine Rauer, demonstrated usage of the standalone application via screen-sharing on Microsoft Teams. The session was recorded for future reference.

Additionally, reviews written for the standalone and web version of Fontes were also taken into consideration. These reviews were written when the standalone and web versions were new but since they had not changed, much of what was written still applied. Due to the challenges of COVID-19, these additional resources were helpful.

Planning

In preparation for the session, several points to look out for during the interview were noted down.

1. Which features were regularly used during use of the application
2. What series of actions were most performed by the user
3. What the user likes/dislikes about the current implementation

**Context Analysis**

After the interview, the recording was reviewed to produce a simplified version of a WAAD. The WAAD typically shows multiple user workflows when using the system, however due to limitations, a simplified version was made.

In figure 6, the blue notes are for headings, the pink notes are comments or points of interest and the yellow notes are steps in the processes. A transcription of the figure below can be found in Appendix 3.

![Figure 6. WAAD (Work Activity Affinity Diagram). This shows how users use the system in reality.](image)

Additionally, based on the comments and observations from the interview, an overview of a typical work process was generated in figure 7. In it, it shows that the user (blue) is the main actor on the system. The user’s relationship to the Fontes database (purple) is to perform a series of searches, the results of which are recorded down (yellow) so that the actual texts (green) can be found in the library (orange). Furthermore, the user should also cite the database (white) in any projects they use it in.
After considering the current work process and comments made during the interview, a set of desirable traits and features for the new Fontes website was created, as seen in figure 8. A transcribed version can be found in Appendix 4.

Understanding the Data
Prior to starting the sketching phase, a full understanding must be gained of the data which will be incorporated. Microsoft Access 365 was used to view the data fields. Although, a large portion of the data fields were self-explanatory, a few fields required correspondence with the client to figure out what they represented. The original database held 10 tables which will be explained in the following sub-sections.
The BIBPRIM table represents the primary bibliography for Fontes. Although the author and title fields appear to be duplicated, inspection of the other tables in the database revealed that this was done to disambiguate texts with the same title. As both DB_AUTHOR and DB_TITLE contain only abbreviations, AUTHOR and TITLE should be used whenever this data is shown to the user.

Another key part of this table is the LOC_EXAMPL and REF_COMMEN fields which work in combination. LOC_EXAMPL provides an example of how to find the location of the entry in the text and REF_COMMEN explains how the location should be read. In the example provided in table 1, LOC_EXAMPL only states 3.14-15 which is ambiguous. However, when read with the REF_COMMEN, it is clear that 3 refers to the chapter while 14-15 refers to the verse. This is important as there are many texts in Fontes and not all follow the same convention.

### BIBPRIM

<table>
<thead>
<tr>
<th>Data Field</th>
<th>Use</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUTHOR</td>
<td>Author name</td>
<td>Abbo of Fleury</td>
</tr>
<tr>
<td>TITLE</td>
<td>Text title</td>
<td>Passio S. Eadmundi</td>
</tr>
<tr>
<td>DB_AUTHOR</td>
<td>Author name for use specifically in database (used as a key)</td>
<td>ABBO.FLOR.</td>
</tr>
<tr>
<td>DB_TITLE</td>
<td>Text title for use specifically in the database (used as a key)</td>
<td>Pass.Eadmund.</td>
</tr>
<tr>
<td>DB_EDITION</td>
<td>Text edition (used as a key)</td>
<td>Winterbottom 1972, 65-87</td>
</tr>
<tr>
<td>BHL_NUMBER</td>
<td>Reference number used in Bibliotheca Hagiographica Latina (a catalogue of Latin works)</td>
<td>6437</td>
</tr>
<tr>
<td>BS_NUMBER</td>
<td>Number assigned to books of the Bible (Biblia Sacra) for ordering purposes</td>
<td>13</td>
</tr>
<tr>
<td>LOC_EXAMPL</td>
<td>An example of how locations from this text are written in the database</td>
<td>3.14-15</td>
</tr>
<tr>
<td>REF_COMMEN</td>
<td>How to read the location of entries for this text. Works in conjunction with the location example</td>
<td>Chapter and verse</td>
</tr>
<tr>
<td>DATE</td>
<td>Date originally published</td>
<td>21/07/1998</td>
</tr>
<tr>
<td>UPDATED</td>
<td>Date last updated</td>
<td>02/02/2000</td>
</tr>
</tbody>
</table>

Table 1. Explanation of BIBPRIM’s data fields

### BIBSEC

<table>
<thead>
<tr>
<th>Data Field</th>
<th>Use</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAME_AND_Y</td>
<td>Author name and year of publication</td>
<td>Abrams 1991</td>
</tr>
<tr>
<td>DATE</td>
<td>Date originally published</td>
<td>21/07/1998</td>
</tr>
<tr>
<td>UPDATED</td>
<td>Date last updated</td>
<td>02/02/2000</td>
</tr>
</tbody>
</table>
Table 2. Explanation of BIBSEC’s data fields

BIBSEC is like a secondary bibliography for Fontes. While BIBPRIM is necessary for all entries, BIBSEC acts as a supplement.

### BIBTEXT

<table>
<thead>
<tr>
<th>Data Field</th>
<th>Use</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUTHOR</td>
<td>Author name</td>
<td>Abbo of Fleury</td>
</tr>
<tr>
<td>TITLE</td>
<td>Text title</td>
<td>Passio S. Eadmundi</td>
</tr>
<tr>
<td>TEXT_EDITION</td>
<td>Text edition</td>
<td>Winterbottom 1972, 65-87</td>
</tr>
<tr>
<td>DATE</td>
<td>Date originally published</td>
<td>21/07/1998</td>
</tr>
<tr>
<td>UPDATED</td>
<td>Date last updated</td>
<td>02/02/2000</td>
</tr>
</tbody>
</table>

Table 3. Explanation of BIBTEXT’s data fields

Most of the information in BIBTEXT already exists in HEADER. The difference here is the publication details which provides much more specific and in-depth information.

### ENTRY

<table>
<thead>
<tr>
<th>Data Field</th>
<th>Use</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEXTREFER</td>
<td>Key to do joins on the HEADER table (used as foreign key)</td>
<td>C.A.1.1.1</td>
</tr>
<tr>
<td>ENTRYREFER</td>
<td>Reference for a specific quote in the text. Entries with the same entry reference share the same location and quote</td>
<td>C.A.1.1.1.001</td>
</tr>
<tr>
<td>ENTRYLOCA</td>
<td>Location for the entry in the text. The entry quote should be found at this location</td>
<td>lines 1-12a</td>
</tr>
<tr>
<td>ENTRYQUOT</td>
<td>Start and end of the quote found in the text at the location specified in the entry location</td>
<td>us is riht micel ... gasta weardum</td>
</tr>
<tr>
<td>SOURCE_REF</td>
<td>Reference number for each source used for an entry</td>
<td>C.A.1.1.1.001.01</td>
</tr>
<tr>
<td>SOURCE_AUT</td>
<td>Author of the source text</td>
<td>ANON</td>
</tr>
<tr>
<td>SOURCE_TIT</td>
<td>Title of the source text</td>
<td>Const.Apost./PS.CLEMENT</td>
</tr>
<tr>
<td>New_source_item</td>
<td>Unknown but optional</td>
<td>21</td>
</tr>
<tr>
<td>SOURCE_ITEM_NO</td>
<td>Unknown but optional</td>
<td>21</td>
</tr>
<tr>
<td>SOURCE EDI</td>
<td>Edition of the source text</td>
<td>PL 76</td>
</tr>
<tr>
<td>BS_NUMBER</td>
<td>Number assigned to books of the Bible (Biblia Sacra) for ordering purposes</td>
<td>07</td>
</tr>
<tr>
<td>BHL_NUMBER</td>
<td>Reference number used in Bibliotheca Hagiographica Latina (a catalogue of Latin works)</td>
<td>6437</td>
</tr>
<tr>
<td>SOURCE_LOC</td>
<td>Location of the entry in the source text</td>
<td>1173BC</td>
</tr>
<tr>
<td>SOURCE QUOT</td>
<td>Start and end of quote in source text that can be found at the location specified in the source location</td>
<td>quod bene ... penetravit</td>
</tr>
</tbody>
</table>
The ENTRY table contains the essence of the Fontes project. Entries map the relationship between Anglo-Saxon (target) texts and source texts. Furthermore, it contains the sigla field which determines the type and certainty of the relationship between source and target text, assigned by experts in the field.

### Table 4. Explanation of ENTRY's data fields

<table>
<thead>
<tr>
<th>Data Field</th>
<th>Use</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEXT_REFER</td>
<td>Unique key for each Anglo-Saxon text (used as primary key)</td>
<td>C.A.1.1.1</td>
</tr>
<tr>
<td>TEXT_AUTHO</td>
<td>Anglo-Saxon text author</td>
<td>ANON(OE)</td>
</tr>
<tr>
<td>New_title</td>
<td>Used for sorting Anglo-Saxon texts by title. Generally the same as TEXT_TITLE unless numbers are involved</td>
<td>Enigma 010</td>
</tr>
<tr>
<td>TEXT_TITLE</td>
<td>Title of the Anglo-Saxon text</td>
<td>Enigma 10</td>
</tr>
<tr>
<td>TEXT_EDITI</td>
<td>Edition where Anglo-Saxon text is available</td>
<td>Ehwald 1919, 30-31</td>
</tr>
<tr>
<td>CONTRIBUTOR</td>
<td>Contributor of text</td>
<td>Andy Orchard</td>
</tr>
<tr>
<td>ENTRIES</td>
<td>The number of entries</td>
<td>1064</td>
</tr>
<tr>
<td>TRANSMISSI</td>
<td>Optional field which provides some context for the text</td>
<td>A homily drawing on Book IV of Gregory's Dialogues.</td>
</tr>
<tr>
<td>BIBLIOGRAP</td>
<td>Maps to records in the BIBSEC table</td>
<td>Liuzza 1994; Liuzza 2000</td>
</tr>
<tr>
<td>DATE</td>
<td>Date originally published</td>
<td>21/07/1998</td>
</tr>
<tr>
<td>UPDATED</td>
<td>Date last updated</td>
<td>02/02/2000</td>
</tr>
</tbody>
</table>

The HEADER table represents the collection of Anglo-Saxon (target) texts in the Fontes database. Most fields are straightforward except for New_title. New_title solves the sorting issue brought by TEXT_TITLE as titles containing numbers are sorted by string value. Because of this, sets of texts would have the second text come after the nineteenth text. New_title solves this by padding numbers with zeros.

### Table 5. Explanation of HEADER's data fields

<table>
<thead>
<tr>
<th>Data Field</th>
<th>Use</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUTHOR</td>
<td>Author name of Anglo-Saxon text</td>
<td>Abbo of Fleury</td>
</tr>
<tr>
<td>TEXT_AUTHO</td>
<td>Author name but in capital letters</td>
<td>ABBO OF FLEURY</td>
</tr>
</tbody>
</table>

The tbllocalAngloSaxonAuthor table contains information about the Anglo-Saxon authors associated with each text entry.

### Table 6. Explanation of tbllocalAngloSaxonAuthor's data fields

<table>
<thead>
<tr>
<th>Data Field</th>
<th>Use</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUTHOR</td>
<td>Author name of Anglo-Saxon text</td>
<td>Abbo of Fleury</td>
</tr>
<tr>
<td>TEXT_AUTHO</td>
<td>Author name but in capital letters</td>
<td>ABBO OF FLEURY</td>
</tr>
</tbody>
</table>
This table contains a list of Anglo-Saxon authors in the Fontes database. Appears to be an unused table as there is no need to reference this table when HEADER already contains the author name.

tblocalSigla1

<table>
<thead>
<tr>
<th>Data Field</th>
<th>Use</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIGIL</td>
<td>Token which represents type or certainty of reference</td>
<td>S</td>
</tr>
<tr>
<td>MEANING</td>
<td>The meaning for the corresponding sigil</td>
<td>Single immediate source</td>
</tr>
</tbody>
</table>

Table 7. Explanation of tblocalSigla1's data fields

This table contains the information which explains what the sigla in ENTRY mean. It maps out the individual token to each meaning as different tokens can be used in combination.

tblocalSigla2

<table>
<thead>
<tr>
<th>Data Field</th>
<th>Use</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIGIL</td>
<td>Examples of how sigla can be put together</td>
<td>M1a</td>
</tr>
<tr>
<td>MEANING</td>
<td>The meaning for the corresponding sigla</td>
<td>Certain source, used in combination with another</td>
</tr>
</tbody>
</table>

Table 8. Explanation of tblocalSigla2's data fields

This table is used solely for providing examples of how sigla tokens can be combined to produce complex meanings. It is not used anywhere but in the “Explain Sigil” function in the Fontes standalone version.

tblocalSigla3

<table>
<thead>
<tr>
<th>Data Field</th>
<th>Use</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIGLA</td>
<td>Examples of how sigla can be put together over multiple entries</td>
<td>M1a, M2a</td>
</tr>
<tr>
<td>MEANING</td>
<td>The meaning for the corresponding sigla</td>
<td>two sources combined, the first certain, the second probable</td>
</tr>
</tbody>
</table>

Table 9. Explanation of tblocalSigla3's data fields

Similar to tblocalSigla2, this table is used solely for explaining how to interpret sigla in the Fontes standalone version. In this case, it is for interpreting multiple sigla when the entries point to the same location.

tblocalSourceAuthor

<table>
<thead>
<tr>
<th>Data Field</th>
<th>Use</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUTHOR</td>
<td>Author name of source text</td>
<td>Abbo of Fleury</td>
</tr>
<tr>
<td>DB_AUTHO</td>
<td>Author name for use in the database</td>
<td>ABBO. FLOR.</td>
</tr>
</tbody>
</table>

Table 10. Explanation of tblocalSourceAuthor’s data fields

This table contains a list of all authors of source texts used in this database. Its use is uncertain as BIBPRIM, which holds the list of source texts, already contains the author for each text.
Initial Designs

The initial designs are based off the set of requirements generated in the previous design stage. Several ideas are generated which provide the framework for going into wireframing. At this stage, the sketches are done on paper as it is fast, disposable and allows for quick changes in ideas.

Scenario Sketches

Scenario sketches imagine how the final product will be used by users and can be used to illustrate features that might make it to the final design. Figure 9 shows an example of a scenario sketch. The whole set of scenario sketches can be found in Appendix 5.

![Figure 9. Scenario sketch showing how the user is imagined using the system](image)

As seen in figure 9, the user is seen reading a text and wondering about the source of a text. The user then uses the Fontes database to find out what text it is and proceeds to the library where they can check out the book.

Designs

The designs below are meant to convey the layout and potential features of the website. Each design idea provides examples of key features. The full collection of sketches can be found in Appendix 6.

Design 1

![Figure 10. Scans of initial design 1. The homepage is the screen on the left and the search is on the right.](image)

The layout of design 1 was planned to be conservative, matching what already has been proven to work in practice. The concept of having the website separated into different sections is
common and familiar to many internet users today, as many websites follow this design pattern. Standard features like a header, a footer and a navigation bar provide the user with an environment which they already understand and know how to use. The separation of the main page and the search here is so first-time users can learn more about what the website is and keeps pages organised.

**Design 2**

![Figure 11. Scan of initial design 2](image)

The concept behind design 2 was to have everything on one page. This would make everything easily accessible from one place. The goal was to have the user feel as if they were interacting with an intelligent assistant with no time wasted or interruptions because of loading pages.

The idea was to have the user perform a search in the search box which would then show the results of the search in the left table. The left column would contain sources if the search was performed on a target text and vice versa. Entries in the left column would then be selectable and selections would populate the middle table to show entries which linked the two texts. Finally, details in the right column would be populated if an entry in the middle table was selected.

**Design 3**

![Figure 12. Homepage of initial design 3. Each author surrounds the search box.](image)
Design 3 takes a different approach as it is more visual based. As seen in figure 12, the distinction between search by target text and source text is gone, only the authors remain. The search bar dynamically filters the authors as the user types by hiding the non-matching authors. The size of the author’s name indicates the number of books attributed to them in the database. Each author is a link which brings the user to the next page (figure 13a).

![Figure 13a & 13b. 13a (left) shows the list of books attributed to an author split into target and source. 13b (right) shows the page that would appear if a target text had been selected in 13a.](image)

Once an author has been selected, the texts attributed to them are shown, as seen in figure 13a. As texts may be both the source and the target, a text may appear in both the target and the source section. If the user clicks on a text on the target texts side, the source texts for that text will appear, as seen in 13b. If the user had clicked on a source text, the next page would instead contain target texts for the source. As with the homepage, the font size corresponds to the number of records contained in the text.

![Figure 14. Details of entries shown after a target and source text have been selected.](image)

Finally, once the target text and the source text have been selected, the user will arrive at the entries page, seen in figure 14. Details of entries can then be viewed by hovering over the entry.

**Wireframes**

The wireframing stage in the process is about turning the ideas into concrete designs. Wireframes show how the layout and features are meant to look as well as demonstrating how the
user workflow should progress. These wireframes were created digitally using Balsamiq. The following sections will highlight key aspects of the design, but the whole set of wireframes can be found in Appendix 7.

While the designs are based off the initial designs, they have been iterated on to introduce improvements. Furthermore, changes to the design were made if certain features were deemed unfeasible. The completion of the wireframe stage for this project means that the final design direction has been decided on.

Wireframe 1

![Wireframed homepage for design 1](image.png)

Figure 15. Wireframed homepage for design 1

Following the initial conservative design, this design aims to be more straightforward. By making the search page the landing page of the website, the user can instantly begin to use the resource. This contrasts with the previous version where the homepage set the context of the resource.

The design keeps the essence of the initial design by maintaining the simple search and standard table of results. However, it also fleshes out some more features such as the print and download function as well as showing the collapsible advanced search (figure 15). Navigation through the search is done by clicking through the records in the table.
Figure 16a and 16b. Entries are shown as accordions once the appropriate texts have been chosen. The top figure shows 16a while the bottom shows 16b.

Figure 16 shows the development of the way entries are displayed. In order to reach this page, the user would have to choose both the target text and the source text by clicking through the appropriate tables. Accordions are used to save space and hide information until the user chooses to open them. The most salient information is kept in the header of the accordion, so the user does not have to open the accordions. The information chosen to be part of the header are the:

- Entry location
- Entry quote
- Sigla (determining the type of reference and certainty of reference)

These three were chosen as if the user already had the texts open, they would be able to find the parts of text which are relevant without opening the accordion.

The driving reason behind using accordions instead of having a table with links to an entry page is to prevent the user from having to click into a page and then back out. This reduces waiting time between page loads and prevents frustration should the wrong link be clicked on.

![Autocomplete feature for the title helps avoid potential searches where no results are found.](image)

This design also features autocompletion as this design is not as dynamic as the others. The title search is meant to help narrow down texts, however there is a risk of a mistake happening and no results being shown. This feature avoids that by not only allowing the user to quickly find the exact text they are looking for without guessing, but also providing suggestions on how the title might be spelled by providing suggestions based on what has already been typed. Additionally, the author is given on the right side to disambiguate texts of the same name.
Figure 18. Wireframe 2’s concept follows the initial design closely with everything on one page. The section highlighted in red shows how the search box would drop down when clicked.

This design fleshes out the second initial design. While the base is the same, key differences include a separate column to show the detailed information, tabs to choose between searching via target text or source text and a method of searching rather than scrolling through a list. Additionally, each column is meant to be populated with data from the start. The idea is that a selection in any of the tables would immediately filter the remaining two, keeping in line with the concept of the resource being intelligent.

Figure 19. The culmination of a search starting from target text.
Figure 19 demonstrates how a potential search would be conducted. Selections in each table would highlight the record as well as place it in the header of each table for ease of reference. Finally, when an entry is selected, the detailed information would be populated with data. Due to limitations of space, the sigla (which determines the type and certainty of the reference) would have its meaning displayed only when hovered over.

![Fontes](image)

Figure 20. The pinned entries feature is a new key design feature developed after iteration on the second initial design when considering how Fontes is normally used.

A new feature in this design is the pinned entries feature, seen in figure 20. This feature allows the user to store entries they are interested in until a later date. Designed as a feature of convenience, the concept is meant to allow users to perform many searches on different texts but still be able to have all interested entries at hand without having to resort to tools outside the system, like pen and paper. Users would then be able to print and download these records as well, allowing them to refer to the information without having to be at their computer. The method to pin entries is by checking the corresponding checkbox in the entries table (highlighted in red in figure 20). The pinned entries can then be opened and closed by clicking on the tab on the right of the webpage. This can be seen by comparing figure 19 and 20.
Wireframe 3

![Wireframe of the concept of the initial third design after development.](image)

While inspired by the concept behind the third initial design, the design changed significantly when iterated on. This design only applies scrolling to the design rather than a mix of different methods like the word-cloud in the initial design. Although now significantly different visually, the imagined user process remains by putting the search by author first. As seen in figure 21, the authors list scrolls automatically depending on what is typed in the search box.

![Figure 22. Once an author has been selected, all texts attributed to them are shown. The texts are split into Anglo-Saxon (Target) and Source texts. This distinction is made as the same text may be both a source and a target, like Christ II here.](image)

Once the author has been chosen, the texts written by the author are shown. The lists which show up are meant to be scrolled through until the correct text is found.
Once a title has been chosen, the user can then select from the authors who have written target or source texts for the text chosen. This can be seen in the left column in figure 23a. Each change to the selection would ripple to the next column to the right. For example, scrolling from “Anonymous” to “Bede” in the authors column would cause the texts in the middle column to show texts written by Bede which were cited in “Christ 2” by Cynewulf. This would also change the entries shown.

Should the user want to view the information at the entry location, they can click on the column to move it to the left. Figure 23b shows this when the text column is clicked in 23a. Should the records in entry location be clicked, a separate page would load with all information regarding that entry.

Feedback

Feedback on the wireframes was given by the client and the project supervisor. This was done via an online meeting on Microsoft Teams where parties could clarify design choices and air comments.

Wireframe 1

Comments were generally positive with certain features being considered very useful, such as the breadcrumbs and autocomplete. As expected, the conservative design was the least debated over.

Wireframe 2

This design was more controversial as opinion on it was split. While the benefits of having the information all on one page appealed to one, the other felt that it was too much on one page. This criticism is valid as users on smaller screens would have a worse experience unless the design was reworked. Another issue which was raised was about the direction in which the user’s choices affects the other columns. The wireframe was designed so that any selection would impact the other two columns. The general consensus on this was that the two-way flow of information combined with the different search methods (starting from target or source) would be too confusing, although a simpler, reworked design may be acceptable.

However, the pinned entries feature received some praise for potentially being helpful.

Wireframe 3

This wireframe was largely rejected due to its relatively confusing and less relevant design and search approach. Comments on the viewing entries stage was that it was not clear how the user could view the detailed information of the entry as clicking in each column results in a different screen being shown. Furthermore, the search approach of author first received disapproval as it put
users in a different mindset when searching the database. This is because the texts themselves were meant to be the focus rather than the authors.

Conclusion

Based on the feedback received on all three wireframes, it was decided that the main design going into the high-fidelity prototyping stage would be the conservative design. However, the pinned entries function from wireframe 2 would also be incorporated into the final design as the idea had some merit.

Hi-Fidelity Prototyping

The high-fidelity prototyping stage fully fleshes out the final design. The end product is exactly what the final product is meant to look like. For this project, Adobe XD was used to create the prototype. The following sections will cover key processes of the system and the entire set can be found in Appendix 8.

Style Choices

Fonts

A subset of fonts was initially chosen to fulfil the goal of providing a feeling of professionalism and establishing the Fontes database as an academic resource. The following fonts were considered after the shortlisting.

Roboto
Bell MT
Cormorant Garamond

Roboto – Christian Robertson

Although serif fonts were heavily preferred due to their more formal appearance, Roboto was considered as it is one of the most used fonts on Google Fonts (A cloud service which hosts fonts that websites can link to). The simple clarity and unambiguous nature of the font would render a body of text a breeze to read. However, although tested, the font did not work as well as hoped as it looked too casual.

Bell MT – Monotype Type Drawing Office

This font was found when checking the list of fonts in the MS Office suite. It provides a strong look with its generally thicker strokes. Furthermore, the font also looks good in body text. However, it was decided that the font was not quite crisp enough.

Cormorant Garamond – Christian Thalmann

Cormorant Garamond is another font hosted on Google Fonts which fit the criteria. The font was chosen for its elegant style (as part of the Garamond family) and thin characters which feels more refined. In the end, this font was chosen as it seemed to naturally fit the theme of Fontes.

Colours

Colours help define the atmosphere of a given product. As the Fontes database is meant to be an academic resource, colours which evoke calmness and thought are preferred. Additionally, as the time period of the texts is heavily based during the Anglo-Saxon period, colours commonly used

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2 A list of fonts on Google Fonts sorted by popularity can be found at https://fonts.google.com/?sort=popularity
in that time were given more consideration when shortlisting. According to preliminary research, colours used in Anglo-Saxon clothes tended to be woad, ochre, madder or green (The English Companions, n.d.).

Main Colour

![Main Colour](image)

*Figure 24. Colours which were shortlisted. These colours were chosen because of their use during Anglo-Saxon times.*

Of all the colours shortlisted, woad (far left in figure 24) was chosen. In addition to its historical context, blue is often considered a professional and clean colour (Morton, n.d.). The other colours did not seem to match with ochre and madder looking too sharp and active, green seeming like a mismatch of theme with its natural ambiance and grey being too dull.

However, on testing on the layout, the woad colour appeared too bright for the background, as seen in figure 25. As a result, another main colour was chosen by continually adjusting the RGB values until a darker, more suitable shade of blue was found. Woad was then changed to a highlighting colour for contrast.

*Figure 25. Comparison of woad and the new shade of blue used as the main colour*
Figure 26 shows an overview of the flow for the final design. As seen, the search is the main component of the system. However, the search and the pinned entries interact to produce a system which "remembers" user’s choices without needing an account.
The final design of the for the search is very similar to the design in the first wireframe. The primary difference between this and the wireframe is that the final design combines the header and the navigation bar and both the target text and the source text are displayed above the table. The combination of the header and the navigation bar saves valuable screen estate as well as providing a cleaner look for the website.

The table is also given alternating shades of grey for each row to provide contrast for visibility. Additionally, a row being hovered on would turn to a darker shade to help the user more easily focus on records they are interested in.

The next step after selecting a text is the same in the wireframe but adds an extra column telling the user how many records there are per text. This was done as certain text combinations of target and source only have one record while other have dozens. By giving the user slightly more information, the user will not be surprised going into the view entries stage.
The final design for the view entries stage is also largely the same but with a few extra features. Features such as citing and sigla interpretation will be fully described in the “Helper Features” section and the pinning function will be explained in the “Pinned Entries” section.

**Pinned Entries**

As stated in the wireframe stage, the concept of pinned entries comes from the desire to store certain records without having to resort to external resources. However, as this feature is new to Fontes, the design would have to be clear and simple to entice users to use it. To realise this, the outline of a pin is used as an icon and placed on the far left of every entry accordion. As the Fontes database primarily deals with texts reading left-to-right, putting the icon in the far left is the most convenient as that is where most users will look first. This decision was driven by eye tracking studies which showed reading patterns on texts read left-to-right were reversed for texts read right-to-left (Pernice, 2017).

*Figure 30. Much like a checkbox, a click on the pin would turn the pin outline into a solid pin to signify that the entry is pinned.*

**No Pinned Entries**

As users may not know what “pinned entries” are when they first use the website, the pinned entries page has a state for when there are no current pinned entries and a state for when there are pinned entries.
Figure 31. When no entries have been pinned, the pinned entries page will show instructions on how to use the feature.

In the case that a user has not pinned any entries but have navigated to the pinned entries page, they will be met with instructions on how to pin entries and how the pinned entries work. Figure 31 shows how the short tutorial would look like.

With Pinned Entries

Figure 32. Pinned entries are sorted in bins by target text then source text.

If the user has pinned entries, the pinned entries will be displayed as accordions sorted by target text then source text. This method of sorting and hiding entries was used to prevent large
number of records from filling up the page and being difficult to manage. As seen in figure 32, the entries still keep their pins so the user can unpin any entry directly from this page as well.

Helper Features and System Artefacts

**Pagination**

![Pagination example in the final design](image)

Pagination is a common way of managing large chunks of data into more manageable sizes. The final design of the Fontes database makes use of pagination to split potentially large numbers of table rows. Generally, the pagination was designed with several rules in mind. These rules were written by Faruk Ateş as 7 points (Ateş, 2010):

1. Provide large clickable areas
2. Do not use underlines
3. Identify the current page
4. Space out page links
5. Provide next and previous links
6. Use first and last links (where applicable)
7. Put first and last links on the outside

Most of these rules were followed with the exception of the first and last links. Instead, where applicable, the first and last links would always be shown using the first and last numbered blocks. This is to always tell the user how many pages remain, rather than them not knowing where the series of table rows end.

**Breadcrumbs**

![Breadcrumbs at their deepest level](image)

Breadcrumbs offer a clean way of allowing the user to return to previous pages and showing them the path they took to arrive at the current page. In the final design, this feature is for convenience rather than serving as the main navigation tool.
As Fontes is intended to be an academic resource, methods of getting the data out of the website are essential. Due to the design of how results are displayed, simply printing the page would not be sufficient as the design would waste printer ink and have to be reprinted if some entry’s accordion was not open. To get around this, separate designs for printing were developed, as seen in figure 35. Two different designs were developed as the requirements for both were slightly different. For the texts, a simple list suffices. However, for entries, every entry needs both the information in the target text and the source text as well as the location and quote information. This is especially relevant for the pinned entries as there may be many different combinations of texts.

For downloading the records, it was decided that piping the data from the database into a CSV would be sufficient.
In modern academic resources, easily citing the resource currently being viewed is a valuable tool. It not only saves the user’s time but also ensures that the method of citing is consistent.

The previous Fontes website included guidelines on how to cite the database and had a popup reminding the user to properly reference the data when entering the website. In final design, the reminder to cite the database is replaced by buttons in each entry which prompts the user to click it for quick citations. The guidelines for how to cite the database is used as a template so users can easily copy and paste it. However, as there are many different ways of citing, the design also provides the relevant information and leaves the choice up to the user.

**Sigla Interpretation**

While the sigla perform an important role in the Fontes database, it is not immediately clear what they represent. The sigla interpretation feature aims to clarify this in the entry body (see figure 32). Once the user is sufficiently familiar with the system, they can simply glance at the entry header to get the information. This feature was suggested and requested by the client.
5. Implementation

This section describes the implementation process from porting the database to implementation of the front and back end. As much of HTML, CSS and JS follow common patterns, this section will only explore the more important or unique features. The end software artefact for the project fully implements design outlined in the Hi-Fidelity section in Design. The final artefact can also be found at: https://ycby.host.cs.st-andrews.ac.uk/search/.

Technologies Used

<table>
<thead>
<tr>
<th>Name</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>Node JS</td>
<td>A modern Javascript runtime environment which is popular for running back end logic for websites</td>
</tr>
<tr>
<td>Express JS</td>
<td>A framework for Node JS which simplifies handling API calls</td>
</tr>
<tr>
<td>MongoDB</td>
<td>A modern NoSQL database which stores data in JSON-like objects allowing data to be easily managed using Javascript</td>
</tr>
<tr>
<td>Pug (HTML)</td>
<td>A HTML templater which works well with Express. A templater is used as most of Fontes’ content is data rather than static content</td>
</tr>
<tr>
<td>Stylus (CSS)</td>
<td>A CSS pre-processor which was built to work with Node JS</td>
</tr>
<tr>
<td>Javascript (with JQuery)</td>
<td>For client-side manipulation of the DOM</td>
</tr>
<tr>
<td>Microsoft Access (2000/365)</td>
<td>Database application which holds the Fontes data that needs to be ported</td>
</tr>
</tbody>
</table>

Table 11. List of technologies used and reasons for their use

Porting the Database

MongoDB was chosen as the new database system to hold the Fontes data. Although a different type of database compared to the relational MS Access, MongoDB has a number of benefits:

- Popular so enjoys support from developers and community
- Stores data in a JSON-like format so data manipulation is simple with Javascript
- NoSQL means queries are simpler to put together
- Has been around for over 10 years so is stable

MongoDB also has its own terminology which differentiates it from traditional databases. Going forwards, the MongoDB terminology will be used. The table below maps the MongoDB term to the traditional term.

<table>
<thead>
<tr>
<th>MongoDB</th>
<th>Traditional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Document</td>
<td>Row</td>
</tr>
<tr>
<td>Collection</td>
<td>Table</td>
</tr>
</tbody>
</table>

Table 12. MongoDB terminology and equivalents

Porting the database proved to be a slight challenge as the initial Fontes data used in the offline version was unopenable with MS Access 365. Luckily, the web version’s files were also available, and the database could be read. The output file format was CSV as this file type allows MongoDB to easily import data. When porting the data, care was taken to ensure the encoding of
the characters was changed to UTF-8 as MongoDB’s encoding uses UTF-8 while the data in MS Access was stored in 1252: Western European format.

The porting method utilised native export functions in MS Access to produce a CSV of the correct encoding. Each table was then imported into their own collections in MongoDB using the import function in Mongo Compass Community, a GUI for MongoDB.

As CSV was used as the intermediary file format, the relationships between the tables were not preserved. As such, a script was written to insert references to other collections. This was done with Mongoose, which does Object-Data mapping for MongoDB. Using Mongoose, models were created to mimic how the original tables worked. Relationships between collections were then mapped by examining how the original database had mapped the tables. Finally, the script (run with node) inserted references to other documents in the collection using each document’s unique MongoDB assigned ID. Figure 37 shows the relationships which were mapped out.

![Figure 37. How the original tables were linked](image)

A script was also run to reformat the dates. The dates in the original database had been stored in a non-standard format so another script was written to convert all dates into standard dates for Javascript using Moment JS.

Design Changes

Pagination

![Figure 38. Changes to pagination to reduce page loads on mis-clicks.](image)

The first design change was altering the previous and next buttons to be unclickable when at the first or last page respectively. This prevents the user from accidentally clicking on buttons which would normally reload the page as an empty link. Additionally, if the user goes to a page not near the start or end of the list, they will still have access to the first and last pages as seen at the bottom of figure 38. This, however, is expected to be a rare case as the user is expected to perform a search to narrow their search results.
Print Pinned Entries

When reviewing the printed page of pinned entries, it became clear that the hierarchy was unclear and that there was duplication as the target text is repeated for every change in source text. To solve this, the printed page was given a more hierarchical structure with target texts stretching across the whole page, source texts being indented under target texts and entries being further indented under source texts. This is illustrated in figure 39.

<table>
<thead>
<tr>
<th>Target Text</th>
<th>Author: ANON (CE Marculology)</th>
<th>Date Added: 03/04/2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agnes</td>
<td>Korn 1981, 2.22:14-23:21</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Author: Aldhelm</td>
<td>Date: Enwald 1969</td>
</tr>
<tr>
<td></td>
<td>Source Location: 29612-29921</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Entry Location: 2.22:15-22:8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Source Text: De virginitate (passo)</td>
<td>Sigla: Mza</td>
</tr>
<tr>
<td></td>
<td>Source Quote: sed et operae ... pepli domuari dominicae</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Entry Quote: 200 geitonude ... 30Kyle grelen</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Author: Aldhelm</td>
<td>Date: Enwald 1969</td>
</tr>
<tr>
<td></td>
<td>Source Location: 512:9-10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Entry Location: 2.83:15-20:8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Source Text: Carmen de virginitate</td>
<td>Sigla: Mza</td>
</tr>
<tr>
<td></td>
<td>Source Quote: Reverit in mundum ... saecule multo</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Entry Quote: 200 geitonude ... 30Kyle grelen</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Author: ANON (CE Marculology)</td>
<td>Date Added: 03/04/2000</td>
</tr>
<tr>
<td></td>
<td>Korn 1981, 2.22:14-23:21</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Author: Anonymous</td>
<td>Date: Enwald 1969</td>
</tr>
<tr>
<td></td>
<td>Source Location: 10:31-36</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Entry Location: 2.22:15-22:8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Source Text: Passio S. Adrianii</td>
<td>Sigla: Sa</td>
</tr>
<tr>
<td></td>
<td>Source Quote: beatas et domine meus ... nunc gloria percneniat</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Entry Quote: 200 bina l憂e ... 30Kyle grelen</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Source Location: 20:17-20:31</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Entry Location: 2.22:13-22:12</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Source Text: Natalis erro seminis ... Natalis erinur spiritum</td>
<td>Sigla: Sa</td>
</tr>
<tr>
<td></td>
<td>Source Quote: Natalis erro seminis ... Natalis erinur spiritum</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Entry Quote: 200 bina l憂e ... 30Kyle grelen</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Author: Anonymous</td>
<td>Date: Enwald 1969</td>
</tr>
<tr>
<td></td>
<td>Source Location: 20:17-20:31</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Entry Location: 2.22:13-22:12</td>
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<tr>
<td></td>
<td>Source Text: Natalis erro seminis ... Natalis erinur spiritum</td>
<td>Sigla: Sa</td>
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<tr>
<td></td>
<td>Source Quote: Natalis erro seminis ... Natalis erinur spiritum</td>
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</tr>
<tr>
<td></td>
<td>Entry Quote: 200 bina l憂e ... 30Kyle grelen</td>
<td></td>
</tr>
</tbody>
</table>

Figure 39. Print version of the pinned entries. The hierarchy is now clear and source texts are not repeated.

Back End

Sigla Interpretation

<table>
<thead>
<tr>
<th>Sigla</th>
<th>Meaning</th>
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<tbody>
<tr>
<td>Sa</td>
<td></td>
</tr>
<tr>
<td>Mza</td>
<td></td>
</tr>
</tbody>
</table>

Figure 40. Sigla interpretation in the front end

The sigla interpretation feature is implemented by reading individual components of the sigla. This feature first connects to the database when the server is launched and prepares a map where the keys are the individual parts of the sigla and the values are the meanings associated with those individual parts. As all this information is from the database, changes to the database’s sigla system will also be appropriately reflected.

When the back end formats data to be returned to the front end, the sigla (if exists) are passed into a function which splits the string based on a known set of tokens. Each token is then used to get the value out of the map. The value is then pushed into an array which the front end can render. The table below shows the possible tokens and their meanings.
<table>
<thead>
<tr>
<th>Token</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>MX</td>
<td>Multiple analogues</td>
</tr>
<tr>
<td>MA</td>
<td>Multiple antecedent sources</td>
</tr>
<tr>
<td>M</td>
<td>Multiple source (one of two or more immediate sources cited for the passage)</td>
</tr>
<tr>
<td>SX</td>
<td>Single analogue</td>
</tr>
<tr>
<td>SA</td>
<td>Single antecedent source</td>
</tr>
<tr>
<td>S</td>
<td>Single immediate source</td>
</tr>
<tr>
<td>1</td>
<td>Certain</td>
</tr>
<tr>
<td>2</td>
<td>Probable</td>
</tr>
<tr>
<td>3</td>
<td>Possible</td>
</tr>
<tr>
<td>a</td>
<td>And (in combination with another source)</td>
</tr>
<tr>
<td>o</td>
<td>Or (an alternative to another source)</td>
</tr>
</tbody>
</table>

Table 13. Sigla tokens and their meanings

**Modules Used – NodeJS**

The modules found in table 14 were used in the implementation of the website. Their versions have also been provided for posterity.

<table>
<thead>
<tr>
<th>Name</th>
<th>Version</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Async</td>
<td>3.2.0</td>
<td>Handling async functions and promises. Useful as MongoDB transactions are asynchronous</td>
</tr>
<tr>
<td>Autocompleter</td>
<td>6.0.3</td>
<td>Used in the front end to get suggestions for the autocomplete feature</td>
</tr>
<tr>
<td>CSV-stringifier</td>
<td>5.5.0</td>
<td>Turns the data from MongoDB into a format which can be downloaded as a CSV</td>
</tr>
<tr>
<td>Express</td>
<td>4.16.1</td>
<td>Framework for handling API calls</td>
</tr>
<tr>
<td>Moment</td>
<td>2.26.0</td>
<td>Date-time formatting</td>
</tr>
<tr>
<td>Mongoose</td>
<td>5.9.16</td>
<td>For object-data mapping when accessing the MongoDB database</td>
</tr>
<tr>
<td>Pug</td>
<td>3.0.0</td>
<td>HTML template</td>
</tr>
<tr>
<td>Nodemon</td>
<td>2.0.4</td>
<td>Development tool that automatically restarts the server when a change in the code is detected</td>
</tr>
</tbody>
</table>

Table 14. NodeJS modules used

**Front End**

The front end was implemented without the use of a CSS framework. Before the start of the implementation stage, the features which made it into the final design did not look complex enough to warrant use of a CSS framework. Furthermore, by using only generated CSS, future changes would only require knowledge of CSS rather than knowledge of the framework as well.

**Copy-Paste from Citations**

The feature to copy and paste a prepared citation is a convenience feature. However, as browser interaction with the clipboard is a security concern, browsers have no standardised function which easily allows this to be implemented. Although the Clipboard API is being worked on, it is still in the working draft phase. As a result, behaviour is non-standard amongst browsers and some features have not been implemented yet. For instance, Firefox cannot copy text using the Clipboard.
API yet. Complicating matters is the deprecation of the previous method, using Javascript’s
document.exec() function.

To get around this, a client-side script was written to try the Clipboard API before falling
back to document.exec(). This solution was suggested by Dean Taylor (Taylor, 2020) as a response to
a question on “how to copy text to the clipboard in Javascript”. By using this method, the Fontes
website will not have to be altered once the Clipboard API becomes standard while still working on
certain older browsers.

Print

As the print designs are quite different from the web designs, custom CSS and HTML were
used to render the pages. When the user clicks on the print button, a new request will be sent to the
server specifying that a print version is wanted. The response formats the data to fit the print design
and automatically calls the browser’s print function on the page. Although the request opens in a
new page, the user will not see anything rendered in the browser as the CSS specifically targets
print.

Storing Searches

As a feature of convenience, the new Fontes system also keeps any text written in the
search field. This prevents the user from having to retype everything if a typo was made. This was
done using session storage. Session storage is deleted when the website is navigated away from or
the tab is closed.

Before the query is sent to the back end, the text in the search fields are stored in session
storage. When the response comes back, the values of the search fields are naturally blank. JQuery is
then used to set the value of these search fields when the page has loaded.

A similar concept is used to store the query string for appending to pagination links. This is
because pagination requires knowing the search so the appropriate offset can be sent to the back
end.

Responsive Web

Responsive web design is a key part of the modern web development process as screens
come in many different sizes. Although the intent for the Fontes website was to be used while sitting
at the desktop in the office, varying screen sizes were considered while implementing the front end.
This was done using the grid method, where columns are assigned to blocks of HTML to control their
sizing.
Figure 42 shows the website on a large screen. It sticks to the main design while having larger text at 16px for the base font. The next breakpoint for slightly smaller screens is exactly the same but with slightly smaller text at 14px for the base font.

Figure 43. The search layout changes for tablet sized screens.

On medium or tablet sized screens, the layout for the results remains the same. However, the search changes by moving the search button to the next row and allowing the advanced search.
fields to stretch the whole way. This is because the search fields for the advanced search were getting too cramped.

For small or mobile sized screens, the navigation bar is hidden in a hamburger menu in the top right and all of the search fields stretch across the page. Even though the navigation bar is responsive, it gets hidden behind the hamburger menu as the size of the buttons on the navigation bar becomes too small and close together. By putting it in the hamburger menu, valuable screen space is saved while keeping the design less cluttered.

The search also moves the title field to the next row and stretches across the page as the field would be too small or hide parts of the search term if it is long enough. Above, the text type fields are also stretched out in order to make it easier for users to click or tap on the right button.

Finally, the entries are also spaced per row instead of having multiple blocks per row. As before, this is to space out the information, so it does not look so cluttered. The choice of having one block per row is due to certain blocks having a lot of content. Additionally, the font size base is changed to 12px.

**Pinned Entries**

The pinned entries feature makes use of modern browser standards to store data without needing to store accounts on the database. Local storage and session storage allow storage of strings in the web browser. Furthermore, data is stored and separated by website, so there is no chance of corrupting data. For the storage of pinned entries, local storage was used as it persists until removed by the website or by clearing browser data. This decision was made after testing with session storage (which is erased after moving to a different website or closing the tab) proved infuriating if the page was accidentally closed or navigated away from.

The challenge of using local storage is that only strings can be stored, so data objects produced in the back end cannot be directly stored. The method used to get around this was to store the MongoDB assigned ID of each entry (which are passed into hidden fields on the rendered
webpage) into an array. The array is then serialised and stored in local storage. Every transaction with local storage is done by un-serialising the array, manipulating the array and then serialising the array before storage.

When the user then visits the pinned entries page, the IDs held in array are then put into a form and submitted to the server via the POST method. POST was mainly chosen so that the entry IDs would not be passed via a query in the URL. On the server side, the contents of the POST request are extracted, and the documents are found using the IDs in MongoDB.

Testing

Due to complications of the COVID-19 and the target audience being unavailable, the final product was not put up for public testing. However, the website was tested with modern browsers to check for any differences between browsers. As this was not possible using localhost, the website was hosted on the school servers at: https://ycby.host.cs.st-andrews.ac.uk/search/. The following browsers were checked based on popularity and availability:

1. Mozilla Firefox (vers. 79.0)
2. Google Chrome (vers. 84.0.4147.125)
3. Microsoft Edge (vers. 84.0.522.59)

During this informal testing, no discrepancies between these browsers were found and all functionality seemed to work. Unfortunately, testing on Safari was difficult as no access to a device which natively uses it was not readily available. When such a device was available for a short period of time, the website seemed to function as expected except for the copy citation function. However, the user could still select and copy the text manually. As mentioned in a previous section, the Clipboard API is still relatively new, so this was not unexpected.

The website was also tested on a mobile device, a Xiaomi A1. The browser used was the Google Chrome browser which was the same version as the desktop version. The website ran as expected on this device. The website also passed Google’s mobile friendly test.

Figure 45. Screenshots from a real mobile device

---

3 This website shows the market share of browsers: https://gs.statcounter.com/browser-market-share
4 The mobile friendly test can be found at: https://search.google.com/test/mobile-friendly
The website was also validated using HTML and CSS validators provided by w3\(^5\) where no errors were found. These validators check for malformed or erroneous code.

\(^5\) The HTML validator is at: [https://validator.w3.org/nu/](https://validator.w3.org/nu/) and the CSS validator is at: [https://jigsaw.w3.org/css-validator/](https://jigsaw.w3.org/css-validator/)
6. Evaluation and Critical Appraisal

This section looks at how the final software artefact compares to the original objectives.

Evaluation against Original Objectives

As written in the Introduction section, the main goals which need to be fulfilled for the project to be considered successful when starting the project were:

1. Port the data into a modern database system
2. Design the web UI for modern standards
3. Implement the designed UI with the core functionality of the Fontes database
   - Search by Anglo-Saxon (target) text
   - Search by Source text
   - Showing results

A set of secondary goals which serve as guidelines were also provided to guide further development of the project if necessary:

- Implementing the non-core functionality of the Fontes database
- Designing further features which could be implemented in a future project

While most of the objectives can be measured, completion of core objective 2 and the secondary goals are less obvious. This section will put forward a self-assessment on the completion of these goals and provide justification as to why they can be considered complete.

Core Goals 1 & 3

Core goals 1 and 3 can be considered fully complete. For porting the database, all data was preserved when exporting the file into CSV format. As this was then imported into MongoDB without alteration, all fields and tables are present in the current implementation of the table. Small edits to the data were made via scripts, but this added relationship information between the MongoDB collections and adjusted certain fields to a standard format.

For core goal 3, the final software artefact clearly demonstrates full completion. Implementation of the final software artefact matches the design outlined in the Design section. The search paths outlined in the Design and Implementation sections show that both search by target text and source text are available. Similarly, the showing results sub-goal is also complete. A set of screens from the website showing this can also be found in Appendix 10.

Core Goal 2

Core goal 2 is also considered to be fully complete as the final software artefact contains features which are in line with modern standards. The following points outline the reasoning for this claim:

- Follows HTML5 and CSS3 guidelines
- Responsive so it fits various screen sizes
- Modern features for academic resources like print, download and cite available
- Artefact uses software that is modern and still receiving support
- Design is simple, logical and familiar

Secondary Goals

The secondary goal of implementing non-core functionality was reached by the design and implementation of the pinned entries function. As outlined in the Design and Implementation
sections, the pinned entries function aims to provide users of the website with convenience. However, since testing and evaluating this feature would require academics who are in the field to use the new Fontes system, the true value of this feature cannot be determined. This is because ethical approval for testing on potential testers outside the University of St Andrews was not gained and many whose feedback on the feature would be relevant are external to the University of St Andrews. Nevertheless, the design and implementation of this feature does fulfil this goal.

The other goal of designing potential features to be included in future work was not complete. This goal was intentionally broad as it was unclear what features would be wanted in the final artefact. Prior to the design phase, features like adding new records or linking entries to digital copies of the text they reference were floated. These ideas were intended to be what would be designed for as an addition. However, this was not realised as implementation of the existing design took precedence.

Opinion of Client

After the implementation phase, a demo was shown to the client via MS Teams. The client was generally happy with the work done.
7. Conclusions

This section summarises the project and provides insight into the successes and failures of the project. Additionally, it discusses what further work could be done in the future.

Project Summary

This project set out to modernise the Fontes database and it generally succeeded by bringing the data to modern systems and revamping the user interface for the web version. The design process focusing on the user’s workflow produced a design which is functional and a new feature which may be useful for users. Finally, as the software artefact provides the core functionality, future work could add new features to it unless the future work requires an overhaul of the system.

Successes and Drawbacks

In general, the whole project could be considered a success. Time management and scoping of the project worked out according to plan. Innovation based on the user’s workflow produced a new convenience feature, although its true value can only be measured after public release.

However, one drawback of this project is the lack of data. Although fortunate enough to have data from a real user of the old Fontes system, the user centred design process truly shines when a large amount of data is collected. Furthermore, the lack of testing of the design also hurts this project. Unfortunately, this was largely due to the circumstances surrounding COVID-19 and ethical approval to question parties external to the University of St Andrews.

Future Work

Currently, the software artefact produced meets the requirements of this project. Nevertheless, more can always be done to improve the new system.

1) Add more information focusing on texts rather than entries

The current system focuses on the entries as they are the main reason for the Fontes project. However, more attention can be given to the texts used. For example, a page can be made which allows the user to get more information on the texts referenced. This can be easily done by extending the current implementation to add a list of texts in the database.

2) Link the Fontes database to digital copies of the texts they reference

Should there be a project to make historical texts open to the public on the internet, the Fontes database could also be modified to link to such texts and zoom to the location where the quotes in the texts are. This would allow scholars to truly have all resources at their fingertips when using the Fontes database. Unfortunately, there is no such project and historical texts are often behind academic paywalls or other barriers as of the completion of this project.

3) Allowing adding entries to the database via the website

Currently, the web version of the Fontes database is read-only. A potential addition would be to allow more entries to be added through the website. This would involve more security concerns but would be a simple way of enforcing how data is entered into the database. However, as mentioned by the client, there is no current project which aims to add any new records to Fontes so this feature is heavily dependent on how researchers who use Fontes want to take its development.

4) Making the mobile experience better
Mobile is increasingly becoming a larger part of the world and academia will not be shielded from it. The current design of the Fontes website is originally for desktop use. Thus, the mobile version, while usable, is lacking and may not provide the desired user experience. Furthermore, the use of mobile fits naturally with the concept of pinned entries so a redesign to the mobile interface could highlight this feature.
Bibliography


Appendix.
## Appendix 1. Plan

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<th>B</th>
<th>C</th>
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</tr>
</tbody>
</table>
Appendix 2. Fontes Bibliography
List from the original Fontes website:


Appendix 3. Transcription of WAAD

Search A-S -> Source: Top, First from Left

Pink Notes:
- Sometimes people see the source and get excited, but it may not really be [the source]. This is what sigla are for.
- Passages in quotes are truncated, more for helping where to find start or end of quotation.

Yellow Notes:
- I start with books so the edition is important to differentiate
- Select A-S text by clicking on record (highlights it)
- Click on “Show Sources for Selected” at bottom [of screen]
- I can see basic info & entries of the selected source as a result
- The text location helps me find the location in the physical book
- I can see the sigla which helps me understand the certainty of the use of the source
- If I want to go back, I hit return at the bottom
- I can also view basic info in the summary box

Search Source -> A-S Author: Top, Second from Left

Pink Notes:
- Same as A-S -> Source but opposite
- PhD searched how A-S authors used in the bible by going through each entry in Fontes

Yellow Notes:
- When I want to search by source author instead, I click on “Source Texts” at the top
- I click on the interested entry to select it
- I click on another “Show A-S Text” button to bring up A-S texts which use this source [at the bottom]
- The “Return” button brings me back to the previous group of entries

Bibliography: Top, Third from Left

Pink Notes:
- Cannot click through to get to bibliography

Yellow Notes:
- If I see entries with a bibliography, I can click into “Bibliography” at the bottom to search it
- In the bibliography page, I can perform a search to find the entry I am interested in

Search Author Reference Summary

Pink Notes:
- Not something often used

Yellow Notes:
- By clicking on the A-S or Source columns, I can see all source/refs the author ever used
- By clicking on both, I can see the appropriate texts
• Once I find the appropriate text, I search the library and can go off and just use that

**Web**

**Pink Notes:**

• The website has been updated since 2002 where the stuff was locked in time

**Yellow Notes:**

• When the web version was up, I always used it because I had bookmarks set up
Appendix 4. Transcription of Desired Features

Start
- Off to Fontes to find Sources

Search
- Anglo-Saxon -> Source
  - Advanced Search / Simple Search
  - Sorting / Filter
  - Search produces results on same page
  - Clarity & prominence [for] submit [button]
  - Suggestions – Autocomplete or from recent searches
- Source -> A-S
  - Advanced Search / Simple Search
  - Sorting / Filter
  - Search produces results on same page
  - Clarity & prominence [for] submit [button]
  - Suggestions – Autocomplete or from recent searches
- Author Reference Summary
  - Search produces result on same page
  - Use as an alternative / experimental tool?

Result
- Results List
  - Download all records
  - Preliminary view of info via different panel?
  - Special CSS for printing list result
  - Bookmark search results (list)
  - Select interested records and store
- Detailed Results
  - Easy citations
  - Descriptive terms / hoverable text
  - More linked terms
  - Give Bibliography info instantly
  - Special CSS printing detailed results
  - Bookmark individual results page

End
- Off to the library to find books
Appendix 5. Scenario Sketches

Sketch showing how the Fontes database is imagined to be used

Sketch showing an early concept of pinning entries and printing
Sketch showing the benefit of bookmarking or a way of storing records being worked with.

Sketch showing how the terms could be clarified in Fontes.
Appendix 6. Initial Sketches

Design 1

Initial idea for the search. Designed to be standard and familiar.

Initial idea for the main page. The main page helps set the context for first-time visitor to the site.
Initial idea for the results. The results page has a list of entries with the details of the selection being shown in the information box to the right.
Design 2

Second initial design. Fills the page with data so all data is available on one page.
Design 3

Word cloud used as focus is on visual representation. Font size increases as number of texts increases.

When an author has been selected, all texts they wrote are displayed. The texts are split into target and source.
Example of when a target text is selected. The source texts for the target texts are then shown and can be clicked.

When both texts have been selected, the list of entries are shown. Hovering over the entry will show its details.
Appendix 7. Wireframes

Wireframe 1

Derived from the first initial design. The biggest change is the removal of the main page.

Main search with the advanced search closed.
Texts are filtered after a search is performed.

When a text is selected, the results table will show the other type of text which relates to the selected text. For target texts, these are source texts. The selected text is also displayed over the results table so it is clear what text the results are for.
The records page when both texts are selected. Clicking on them will open the entry.

Detailed information when the entry has been clicked open.
A demonstration of the autocomplete function imagined, with title and author shown.
Derived from initial design 2. All information is shown. A new column has been added for so that both target and source texts can be seen and selected.

The dropdown search menu for filtering results in the column.
Records in any column can be selected. Each record selected changes the records in other columns.

Example of multiple columns having a selected record.
When an entry has been selected, the detailed information will be shown. Sigla interpretation is available on hover.

An example of searching by source instead of target text.
Wireframe 3

Derived from the third design. There is a focus on visual representation.

As text is typed into the search bar, the list automatically scrolls to the relevant position.
Cynewulf

Anglo-Saxon Texts

Christ 2 (The Ascension)

Eliene
Fate of the Apostles
Juliana

Source Texts

Christ II
Eliene

Texts shown once the author has been selected.

Cynewulf

Anglo-Saxon: Christ 2 (The Ascension)

Author        Text        Entry Location
Anonymous      Acta Pilati  lines 558-585

The column to the left of the current column determines what is shown in the current column.
If the author column is clicked on, the screen slides to the left, allowing detailed entries to be shown but disallowing the changing of authors.

If the text column is clicked on, the screen slides to the left even more to only show the entry location and detailed information.
A wireframe of what the print dialogue was imagined to look like.
Appendix 8. Hi-Fidelity Prototype

Imagined landing page for the final design. The design follows wireframe 1’s design but adds pinned entries.
Landing page with the advanced search closed.
How autocomplete looks in the final design.
When the autocomplete option has been selected, the selection is entered into the search.
Results after a search has been performed.
Once the target text has been selected, the title is kept above the results table and the results show the sources used in that text.
When both texts have been selected, the entries are shown. The pin on the left allows pinning of entries. The entries are opened by clicking on the accordion.
The entries when expanded.
The citing functionality which allows easy access to information used in citing alongside the copy text function.
Pinned Entries

It looks like you haven’t pinned any entries yet. To pin an entry, click the ‘pin’ icon on the top-left of a record.

You can pin entries from various searches so you can collect all entries you are interested in a centralised location. However, these records will be deleted on the closing of your browser, so be careful.

If no entries have been pinned, the pinned entries should show users how to pin entries.

Pinned Entries

Felix
Vita S. Guthlac

Pinned entries are sorted into buckets, first by target text. This prevents records from rapidly filling the page.
After target texts, the pinned entries are then put into buckets by source text.

Finally, the entries can be viewed. Unpinning entries can also be done at this stage.
Entries contain the same information as entries from the search.
# Books

<table>
<thead>
<tr>
<th>Title</th>
<th>Author</th>
<th>Edition</th>
</tr>
</thead>
<tbody>
<tr>
<td>De miraculis</td>
<td>Aldhelm</td>
<td>Elwold 1939</td>
</tr>
<tr>
<td>De virginitate (prose)</td>
<td>Aldhelm</td>
<td>Elwold 1939</td>
</tr>
<tr>
<td>Vita S. Fursei</td>
<td>Anonymous</td>
<td>Heier 1965</td>
</tr>
<tr>
<td>Vita Antonii</td>
<td>Athanasius (transl. Evagrius)</td>
<td>PL 73</td>
</tr>
<tr>
<td>Vita S. Caroli (verse)</td>
<td>Bede</td>
<td>Jaager 1935</td>
</tr>
<tr>
<td>Vita S. Caroli (prose)</td>
<td>Bede</td>
<td>Colgrave 1940</td>
</tr>
<tr>
<td>1 Corintherios</td>
<td>Biblia Sacra</td>
<td>Weber 1975</td>
</tr>
<tr>
<td>1 Iohannis</td>
<td>Biblia Sacra</td>
<td>Weber 1975</td>
</tr>
<tr>
<td>2 Corintherios</td>
<td>Biblia Sacra</td>
<td>Weber 1975</td>
</tr>
<tr>
<td>Acus apostolorum</td>
<td>Biblia Sacra</td>
<td>Weber 1975</td>
</tr>
<tr>
<td>Colossenses</td>
<td>Biblia Sacra</td>
<td>Weber 1975</td>
</tr>
<tr>
<td>Deuteronomium</td>
<td>Biblia Sacra</td>
<td>Weber 1975</td>
</tr>
<tr>
<td>Ephesios</td>
<td>Biblia Sacra</td>
<td>Weber 1975</td>
</tr>
<tr>
<td>Genesis</td>
<td>Biblia Sacra</td>
<td>Weber 1975</td>
</tr>
<tr>
<td>Iacobi</td>
<td>Biblia Sacra</td>
<td>Weber 1975</td>
</tr>
<tr>
<td>Job</td>
<td>Biblia Sacra</td>
<td>Weber 1975</td>
</tr>
<tr>
<td>Isaiae</td>
<td>Biblia Sacra</td>
<td>Weber 1975</td>
</tr>
<tr>
<td>Lucam</td>
<td>Biblia Sacra</td>
<td>Weber 1975</td>
</tr>
<tr>
<td>Marcum</td>
<td>Biblia Sacra</td>
<td>Weber 1975</td>
</tr>
<tr>
<td>Matthaeum</td>
<td>Jerome</td>
<td>Weber 1975</td>
</tr>
<tr>
<td>Numeri</td>
<td>Biblia Sacra</td>
<td>Weber 1975</td>
</tr>
<tr>
<td>Philippenses</td>
<td>Biblia Sacra</td>
<td>Weber 1975</td>
</tr>
<tr>
<td>Proverbia</td>
<td>Biblia Sacra</td>
<td>Weber 1975</td>
</tr>
<tr>
<td>Vita S. Pauli eremitarum</td>
<td>Biblia Sacra</td>
<td>PL 23</td>
</tr>
<tr>
<td>Romani</td>
<td>Biblia Sacra</td>
<td>Weber 1975</td>
</tr>
<tr>
<td>Carmin paschalt</td>
<td>Caecilius Sedulius</td>
<td>CSEL 140</td>
</tr>
<tr>
<td>Liber scintillarum</td>
<td>Defender</td>
<td>CCSL 117</td>
</tr>
<tr>
<td>Dialogi</td>
<td>Gregory the Great</td>
<td>De Vogüé 1978-80</td>
</tr>
<tr>
<td>Moralia sive exposition in Iob</td>
<td>Gregory the Great</td>
<td>CCSL 143-143B</td>
</tr>
<tr>
<td>Psalmi (unspecific)</td>
<td>Biblia Sacra</td>
<td>Weber 1975</td>
</tr>
</tbody>
</table>

Custom print design, used to prevent wastage of ink and have only the important information shown.
<table>
<thead>
<tr>
<th>Entries</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Initial Book:</strong> Vita S. Guthlac</td>
</tr>
<tr>
<td><strong>Edition:</strong> Colgrave 1936</td>
</tr>
<tr>
<td><strong>Secondary Book:</strong> De metris</td>
</tr>
<tr>
<td><strong>Source Location:</strong> 61.1-2</td>
</tr>
<tr>
<td><strong>Entry Location:</strong> 61.1-2</td>
</tr>
<tr>
<td><strong>Source Location:</strong> 61.4-6</td>
</tr>
<tr>
<td><strong>Entry Location:</strong> 60.3-5</td>
</tr>
<tr>
<td><strong>Source Location:</strong> 66.5-7</td>
</tr>
<tr>
<td><strong>Entry Location:</strong> 81.25</td>
</tr>
<tr>
<td><strong>Source Location:</strong> 74.2</td>
</tr>
<tr>
<td><strong>Entry Location:</strong> 60.7-8</td>
</tr>
</tbody>
</table>

Custom print design but for entries as the needs are different from just printing texts.
Appendix 10. Website

The website can currently be found at https://ycby.host.cs.st-andrews.ac.uk/search/. The page should work on any modern browser. However, this section will also provide some screenshots of the current iteration of the website.

Landing page of the website.

The autocomplete feature in action.
After a target text has been selected, all sources used are shown. In this case, only one source was used.

When both texts have been selected, the entries can be viewed.
The entry when the accordion has been clicked.

The citation function which allows copying of text by clicking on the button.
When no entries have been pinned, a short tutorial will show. The pin allows users to try clicking on it to see what happens.

The pinned entries page when pinned entries have been added.
The about page which holds static text regarding Fontes.

The help page which provides short instructions on how to use the resource.
Example of the new design for printing pinned entries.

![Example screenshots taken on an actual phone.](image-url)
Appendix 11. Ethics Self-Assessment

UNIVERSITY OF ST ANDREWS
TEACHING AND RESEARCH ETHICS COMMITTEE (UTREC)
SCHOOL OF COMPUTER SCIENCE
ARTIFACT EVALUATION FORM

Title of project
- Modernising the Fontes Database

Name of researcher(s)
- Ying Cong Bryan Yick

Name of supervisor
- Dr. Mark-Jan Nederhof

Self audit has been conducted **YES**

This project is covered by the ethical application CS12476 (amended for 2019/20 due to COVID-19)

Signature Student or Researcher

[Signature]

Print Name
- Ying Cong Bryan Yick

Date
- 25/05/2020

Signature Lead Researcher or Supervisor

[Signature]

Print Name
- Dr. Mark-Jan Nederhof

Date
- 25/05/2020