

THE PUBLIC IS MORE FAMILIAR WITH BAD DESIGN THAN GOOD DESIGN. IT IS, IN EFFECT, CONDITIONED TO PREFER BAD DESIGN, BECAUSE THAT IS WHAT IT LIVES WITH. THE NEW BECOMES THREATENING, THE OLD REASSURING.

PAUL RAND

A DESIGNER KNOWS THAT HE HAS ACHIEVED PERFECTION NOT WHEN THERE IS NOTHING LEFT TO ADD, BUT WHEN THERE IS NOTHING LEFT TO TAKE AWAY.

ANTOINE DE SAINT-EXUPÉRY

...THE DESIGNER OF A NEW SYSTEM MUST NOT ONLY BE THE IMPLEMENTOR AND THE FIRST LARGE-SCALE USER; THE DESIGNER SHOULD ALSO WRITE THE FIRST USER MANUAL...IF I HAD NOT PARTICIPATED FULLY IN ALL THESE ACTIVITIES, LITERALLY HUNDREDS OF IMPROVEMENTS WOULD NEVER HAVE BEEN MADE, BECAUSE I WOULD NEVER HAVE THOUGHT OF THEM OR PERCEIVED WHY THEY WERE IMPORTANT.

DONALD E. KNUTH

THE TUFTE-LATEX DEVELOPERS

A TUFTE-STYLE BOOK

PUBLISHER OF THIS BOOK

Copyright © 2016 The Tufte-LaTeX Developers

PUBLISHED BY PUBLISHER OF THIS BOOK

TUFTE-LATEX.GOOGLECODE.COM

Licensed under the Apache License, Version 2.0 (the “License”); you may not use this file except in compliance with the License. You may obtain a copy of the License at <http://www.apache.org/licenses/LICENSE-2.0>. Unless required by applicable law or agreed to in writing, software distributed under the License is distributed on an “AS IS” BASIS, WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied. See the License for the specific language governing permissions and limitations under the License.

First printing, April 2016

Contents

Planning 13

Solution Overview 17

Development 19

Functionality & Extensibility 21

Evaluation 23

Bibliography 25

Index 27

List of Figures

1	This is Joe.	13
---	--------------	----

List of Tables

*Dedicated to those who appreciate \LaTeX
and the work of Edward R. Tufte and Donald E. Knuth.*

Planning

Solution Scenario

Situation for the application of a solution. For example, a student is looking for colleges to apply to.

Client

Here we state the name of the client and describe who they are. For example, a student named Joe McJoe is an American student with an interest in poetry and soccer who wants to attend school on the west coast for under \$30,000. He currently attends EF.

Proof of Consultation

Here we provide proof of the consultation. For example, before meeting I emailed the client to explain the IA project. We agreed to meet for two hours on Sunday May 3rd at 2:00 PM at the Coffee Lab in Tarrytown.

Include copy of email. Include a link to his facebook? Take a picture of him? Take a picture of your notes from the meeting.

Synopsis of meeting.

Product Rationale

Describe briefly how to address client needs with solution. For example, design a Java application that allows student to search a database of colleges according to different criteria. ¹

Background Research

Required input, calculations, and mathematical models stated in general terms. Although you will be the primary user of the program, input/output should be described for a hypothetical end user who could potentially duplicate or extend your work.



Figure 1: This is Joe.

¹ Edward R. Tufte. *Envisioning Information*. Graphics Press, Cheshire, Connecticut, 1990. ISBN 0-9613921-1-8

References used for background research—minimum of 5. Note that while the Wikipedia is a great place to start, it is not itself a valid reference. Most of these should be from technical journals. Web pages, if appropriate should, at a minimum, include the URL, the author or organization providing the information, and the date. any commonly used form for references is acceptable as long as it contains enough information to find the data.

In addition each student should find a research mentor with in-depth expertise of the subject, other than the teacher who is at minimum available by e-mail. ^{2 3 4 5 6}

² Edward R. Tufte. *Envisioning Information*. Graphics Press, Cheshire, Connecticut, 1990. ISBN 0-9613921-1-8

³ Edward R. Tufte. *Beautiful Evidence*. Graphics Press, LLC, first edition, May 2006. ISBN 0-9613921-7-7

⁴ Hideo Umeki. The geometry package. <http://ctan.org/pkg/geometry>, December 2008

⁵ Frank Mittelbach and Michel Goossens. *The L^AT_EX Companion*. Addison-Wesley, second edition, 2004. ISBN 0-201-36299-6

⁶ Robert Bringhurst. *The Elements of Typography*. Hartley & Marks, 3.1 edition, 2005. ISBN 0-88179-205-5

Success Criteria

Must have at minimum an introduction clearly stating the objectives/goals of the solution to the problem and contain an outline, bullet list, or table with the minimum performance and usability criterion so that they are easily scanned.

In simulations performance and usability criterion are often defined by simplifying assumptions. For example, in a projectile motion simulation if air resistance is assumed to be negligible, the simulations solutions will only be valid for low speeds.

Here make a list with description of each criteria for success of product. For example:

Existing Database This software should have a database of colleges for the student to look at. The database should be searchable.

Search by Tuition Database should be searchable by tuition costs

Search by Location Database should be searchable by location

Search by Majors Database should be searchable by available majors

Search by Class Size Database should be searchable by average class size

Saving of Searches Searches can be saved by software

Intelligence Want student to be able to indicate colleges that are desirable and have software suggest similar colleges.

Ordered List The returned list of search orders the colleges from best to worst according to criteria of search.

Solution Overview

Record of Tasks

Here we include a record of tasks.

Start Date	Action	Detail	Comments	End Date	Criterion
10-10-2010	Research college application process	I Googled and googled and googled and googled	Google is the best thing that has ever happened in the history of googling	10-20-2010	A
10-12-2010	Downloading and compiling information for database	Went to US World and News Report and downloaded full database using a Python script	This process is challenging to do by hand so using the bot was super duper helpful. Thanks mom.	10-22-2010	B
10-12-2010	Project repository initialized	Setup a project repository on github titled javabeg under account Tris	https://github.com/Tris/javabeg.git	10-22-2010	B
10-12-2010	Developing Classy class	Wrote class called Classy with fields x, y, z and methods methodA and methodB	These methods allow me to do this and that. Commit hash: a17ab60957	10-22-2010	B

Design Overview

This section starts by describing an initial design for some of the main objectives that were determined to be the criteria for success. It should consist of the following:

- a brief verbal description.
- a block diagram of the program with at least one block describing user input, one describing the manipulation of the input, one describing file I/O, and a 4th describing the output. Bullet statements can be used for the descriptions within each box.
- The prototype is based on functional decomposition. It is a top-down design that includes NO, repeat NO code. It must include:

- A brief written summary of the way the program will function that references items 2-4 below. Can be in outline form.
- Fully annotated computer-generated drawings of the user interface and output. There should be multiple drawings showing the expected output under various conditions.
- A list identifying all I/O.
- User feedback in support of the design.. (At least part of this feedback must come from the teacher.)

Detail what resources must be collected to execute the project. If a developer's licence is needed state that. If any hardware must be obtained state what is needed. If certain data sets need to be acquired state that.

The design overview should include an outline test plan.

For example: State language

Explain database structure: College object

Search object

Create a dummy student

Create a example college database

Test example search with a dummy search

Development

Techniques

IB asks for the use of techniques which demonstrate a high level of complexity and ingenuity in addressing the scenario identified in criterion A. They are characterized by the appropriate use of existing tools and the techniques are adequate for the task. Their use is explained. All sources are identified.

Here we detail techniques used in the project. Techniques may include the following.

- Arrays
- User-defined objects
- Objects as data records
- Simple selection (if/else)
- Complex selection (nested if, if with multiple conditions or switch)
- Loops (while for)
- Nested loops
- User-defined methods
- User-defined methods with parameters (the parameters have to be useful and used within the method body)
- User-defined methods with appropriate return values (primitives or objects)
- Sorting
- Searching
- File i/o
- Use of additional libraries (such as utilities and graphical libraries not included in appendix Java Examination Tool Subsets)
- Recursion
- Merging two or more sorted data structures
- Polymorphism
- Inheritance
- Encapsulation
- Parsing a text file or other data stream
- Abstract data types
- Interfaces

Functionality & Extensibility

This section assesses the extent to which the product functions. A video is used to evidence functionality. Future modification and expansion is also discussed as detailed in the design and development documentation.

Video

The video can be found at <http://youtube.com/5Tygy>

Evaluation

This section must evaluate the effectiveness of the product based on feedback from the client/adviser. This must include direct references to the success criteria identified in criterion A. The student must recommend proposals for the future improvement of the product.

Client Feedback

The client feedback should be detailed here.

Success Criteria Review

Here you go through and repeat the Success criteria list and review the success of each criteria.

Existing Database The database was successfully constructed and includes over 500 colleges and universities in the US.

Search by Tuition Tuition costs were found for each college and included in the database

Search by Location Location of each school was included by address and GPS coordinates

Search by Majors Majors were included for colleges with majors. Schools without majors were still included in the database.

Search by Class Size Average class size was included in the database

Saving of Searches Each user can save five searches

Intelligence This feature had limited success

Ordered List The output of the search gave a match score to each college and listed the colleges in descending order

7

Future Improvement

Here you detail future improvement of the project. ⁸

⁷ Edward R. Tufte. *The Visual Display of Quantitative Information*. Graphics Press, Cheshire, Connecticut, 2001. ISBN 0-9613921-4-2

⁸ Edward R. Tufte. *Beautiful Evidence*. Graphics Press, LLC, first edition, May 2006. ISBN 0-9613921-7-7

Bibliography

Robert Bringhurst. *The Elements of Typography*. Hartley & Marks, 3.1 edition, 2005. ISBN 0-88179-205-5.

Frank Mittelbach and Michel Goossens. *The L^AT_EX Companion*. Addison-Wesley, second edition, 2004. ISBN 0-201-36299-6.

Edward R. Tufte. *Envisioning Information*. Graphics Press, Cheshire, Connecticut, 1990. ISBN 0-9613921-1-8.

Edward R. Tufte. *The Visual Display of Quantitative Information*. Graphics Press, Cheshire, Connecticut, 2001. ISBN 0-9613921-4-2.

Edward R. Tufte. *Beautiful Evidence*. Graphics Press, LLC, first edition, May 2006. ISBN 0-9613921-7-7.

Hideo Umeki. The geometry package. <http://ctan.org/pkg/geometry>, December 2008.

Index

license, [4](#)