Planning

Useful feedback in the Ampersand parser

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1 Introduction (R-M)

1.1 Identification

This document contains the planning for the execution of the graduation project "Useful feedback in the Ampersand parser". This planning gives the high-level requirements, the risks and a timefor the project. As such, the planning provides the steps for reaching the project objectives, and provides criteria that are used to validate and accept the results of the graduation.

This document is part of the graduation project of the computer science bachelor at the Open Universiteit Nederland. The project "Useful feedback in the Ampersand parser" is assigned to the students Daniel Schiavini and Maarten Baertsoen, with support of the supervisor Dr. Bastiaan Heeren and examiner Marko van Eekelen. The assignment is given by professor Stef Joosten, who researches how to further automate the design of business processes and information systems by the development of the Ampersand project.

1.2 Goal of this document

The main goal of this document is to capture the taken decisions and agreements around the execution of the project. In order to make the targets clear, the project context is also depicted in the document.

The document describes the current situation and the issues it presents, making clear why the project has been started. The purpose is thus to describe the management approach and the describe the aimed solution in high-level, as well as chances, risks and problems that might occur.

1.3 Document overview

An introduction is given is this chapter. Afterwards, a general description of the project is given in section 2. Then, in section 3, strategies are proposed for the acquisition of knowledge. In section 4 the project approach is explained and the management strategy is given in section 5.

Assumptions and limitations are given in section 6. Afterwards, possible interferences with other projects are given in section 7. Strategies for risk management are then proposed in section 8.

Details of the development techniques are given in the project realization strategies of section 9. Testing and validation plans are in section 10, while issue management is explained in section 11. The strategy for integration of the released software is given in section 12, while the documentation strategy is given section 13 and the used tools and methodologies are given in section 14.

Finally, a glossary of terms, definitions and abbreviations is given in subsection 14.5.

2 Project description (D)

2.1 The Ampersand project

In November 2003, the Business Rules Manifesto[1] was written, with the main purpose of declaring independence for business rules in the world of requirements. The manifesto supports the vision of business rules as equivalent to requirements. This is considered a radical change on how people see the world of business architecture.

In December 2010, Stef Joosten, Lex Wedemeijer and Gerard Michels published the paper "Rule Based Design", presenting the Ampersand approach. The approach puts the rules in the center, using them to define the business processes. Ampersand is named after the & symbol with the desire of realizing results for both business and IT, in an efficient and effective way.

In 2011, the Ampersand compiler was created as an open source project. Since then, the compiler has been improved and applied in both business and academic contexts. The Ampersand end-users write business rules in a specific language (ADL), and compile that specification into functional specification, documentation and working software prototypes.

The theory behind Ampersand has been throughly studied, and is based on mathematical concepts, e.g. Tarski's axioms. Using this compiler, users write the requirements in ADL and generate all the system specification. This way the requirements consistency and traceability are always correct, from the lowest level up to the front-end. The requirements can be presented to business stakeholders in natural language, guaranteeing that any business expert (who is knowledgeable in matters of content) can validate the requirements.

2.2 Current situation

The compiler developed for the Ampersand research project runs in several steps (see subsection 2.4 for the architecture). The first step is the parsing of the input scripts. One of the main complaints from users is the quality of the errors generated by the Ampersand parser. Since the beginning of the project, the parser subcomponent has never been analyzed for improvements.

In order to generate better error messages, it is assumed that a complete refactoring of the parser will be necessary. The main challenge is to choose the correct kind of architecture and libraries in order to generate the most user-friendly messages possible.

Besides the main project task of improving the parser's feedback, a list of user wishes has accumulated over the years.

2.3 Goals of the project

The main objective for the graduation project is to implement useful feedback in the Ampersand parser. In order to achieve this goal, some of the following activities can take place:

- Analysis of user-friendly messages in compilers;
- Comparison of different Haskell parsing libraries (also for pretty-printing);

[1] `http://www.businessrulesgroup.org/brmanifesto.htm`

- Researching tools and techniques in Haskell for improving the software quality (e.g. testing and error messages);
- Analysis of the current development environment in relation with software engineering principles such as continuous delivery/integration;
- Recommending improvements for the overall software quality;

In case the new parser is successfully implemented and accepted, while the project members still have time budget available, the list of open user wishes issues can be addressed. Some of these wishes are substantial, so that most of them cannot be fulfilled during the graduation project. The current list of open issues has been provided[2], although it must be clear that the issues are strictly seen as lower priority.

2.4 Project architecture, components and environment

The Ampersand compiler is divided in several subcomponents:

Parser receives the ADL code as input, and parses that code into a parse-tree (also known as P-structure).

Type checker receives the P-structure as input and converts it into a relation algebra format, suitable for manipulation (also known as A-structure or ADL-structure). The semantics of ampersand are expressed in terms of the A-structure.

Calc receives the A-structure as input, and manipulates it according to the research rules, generating the functional structure (also known as F-structure). The F-structure contains all design artifacts needed to write a specification and generate the output.

Output components : All design artifacts present in the F-structure are ready to be rendered. Several components use this data structure to generate the wished output. Outputs currently implemented (and their output formats) are the following: Atlas (HTML interface), revert (Haskell source), Query (prototype generation) and Documentation Generator (Pandoc structure).

The complete architecture is depicted in Figure 1. The part of this architecture relevant for this project is depicted in Figure 2.

2.5 Critical success factors

The following factors are critical for the project's successful conclusion:

Maintainability : the code shall at least be as maintainable as the current Ampersand code. It is known however that maintainability is hard to measure (see also section 8).

Production code : the implemented functionalities shall be integrated into the master branch for production use;

Users context : in order to provide useful feedback, the user context wherein the Ampersand compiler is used needs to be well understood, and the improvements must have extra user value;

[2] `https://github.com/AmpersandTarski/ampersand/tree/ABI_Parser/ArchitectureAndDesign`

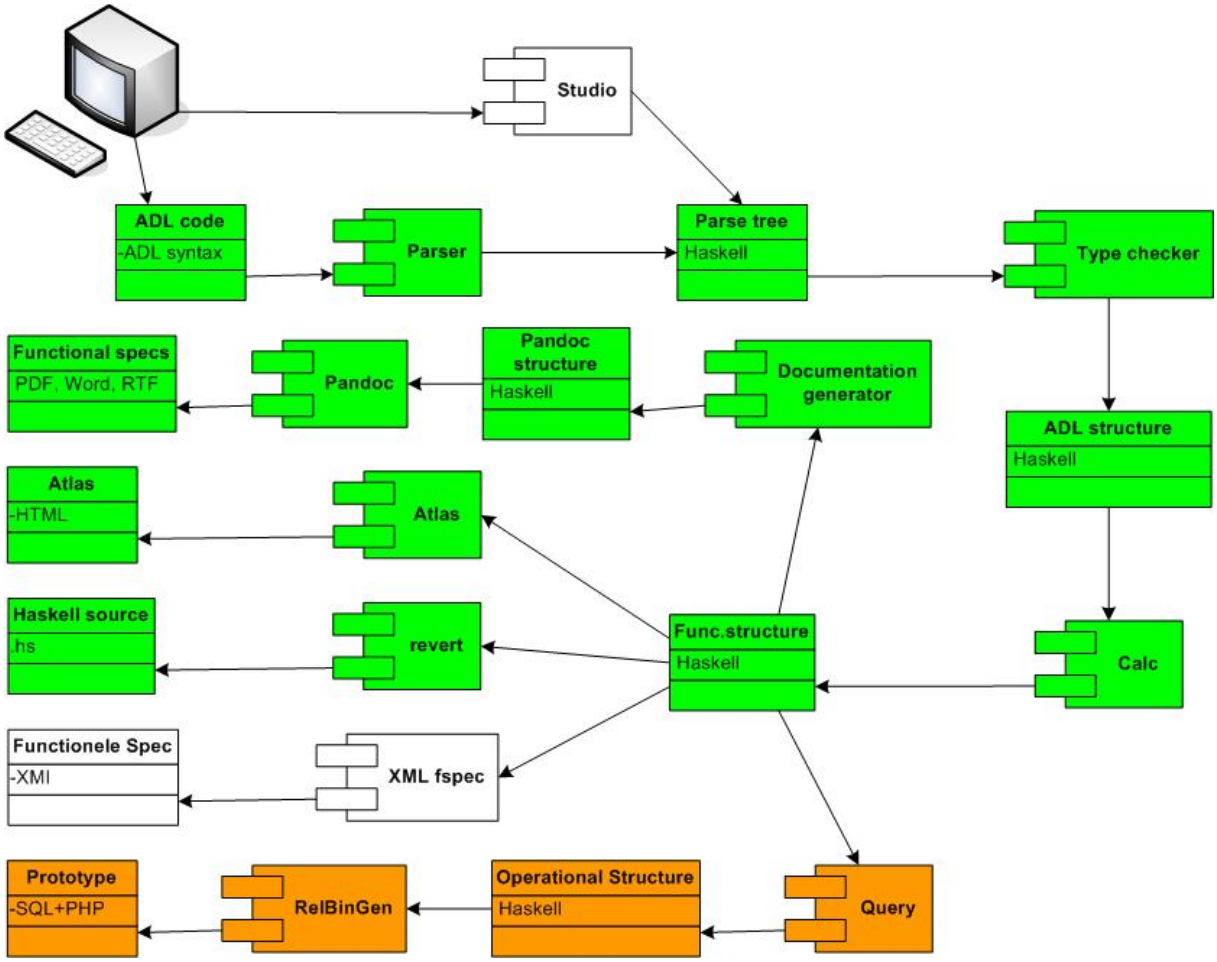

Figure 1: Architecture of the project, showing where the parser fits in the Ampersand system

The components in green background are part of the Ampersand compiler. Components in orange are part of the Ampersand Prototype compiler. Finally, components in white background are future components, not yet implemented.

2.6 Objectives and commitments

Towards the project and customer

3 Knowledge acquisition (-)

3.1 Research context

Some ideas by Bastiaan:

- more info on ampersand users
- user-friendly error messages (specific to compilers or not)
- parser-libraries
- Stef's research (3a)
- Haskell parsers (e.g. Helium), monadit or combinators

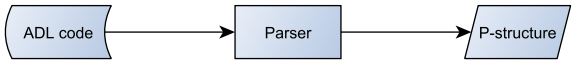

Figure 2: Relevant data flow for the Ampersand parsing component

3.2 Domain & technology

3.2.1 Part Daniel

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3.2.2 Part Maarten

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3.3 Knowledge documentation

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4 Project approach (-)

4.1 Project methodology

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4.2 Project planning

Milestones & phases

4.3 Project milestones and corresponding deliverables

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5 Project management (M)

5.1 Project governance / roles & responsibilities

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5.2 Communication

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5.2.1 Internal

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5.2.3 Customer

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5.3 Time keeping

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5.4 Project reporting

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5.5 Quality assurance

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5.5.1 Process quality & monitoring

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5.5.2 Deliverables quality & monitoring

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6 Assumptions and limitations (-)

(knowledge/architecture/etc...)

7 Interferences with other projects (-)

(code conflicts, etc...)

8 Risk management (M)

8.1 Risk identification and qualification

8.1.1 Functional risks

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8.1.2 Technical risks

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8.2 Risk mitigation plan

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9 Project realization (-)

9.1 Coding conventions

De coding conventions are described on the Ampersand wiki [3].

9.2 Scrum approach

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9.3 Validation

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[3] http://wiki.tarski.nl/index.php/Coding_conventions

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10 Testing & Validation (-)

10.1 Test approach

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10.2 Test methodology

Will we use student's data? That can be hard to do.

10.3 Test plan & Milestones

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10.4 Test documentation

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11 Issue management (-)

12 Integration & release (-)

(acceptation, communication, etc...)

13 Documentation (-)

13.1 Documentation plan

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13.2 Deliverables

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14 Tools, methodologies and accelerators (R-M)

14.1 Collaboration

For the collaboration between the project members, the following tools will be used:

Dropbox For sharing time tracking and other reference documents;

GitHub For sharing git repositories of code, besides managing issues and documentation;

SourceForge For managing existing (old) issues;

Microsoft Office For writing internal documents, e.g. time tracking;

14.2 Documentation

For writing the documentation, the following tools will be used:

Haddock For annotating documentation on the code;

TeXworks For writing and compiling LaTeX documents;

Ampersand Wiki For keeping notes and information useful for users and other developers;

14.3 Design

For designing the software and its architecture, the following tools will be used:

yEd For creating diagrams and graphs;

14.4 Development

For software development, the following tools will be used:

IDE No standard integrated development environment will be chosen: the project members are free to use any IDE, e.g. Eclipse, Leksah, Notepad++;

GHC The compiler GHC (Glasgow Haskell Compilation System), version 7.8.3, will be used;

Cabal For managing Haskell packages and compilation, cabal-install version 1.18.0.5 and Cabal library version 1.18.1.3.

14.5 Testing

Finally, the following tools will be used for testing the software:

Hpc might be used for checking, recording and displaying the code coverage of tests;

Sentinel server can be used for the integration tests;

QuickCheck for automating tests on the code and property based testing (e.g. pretty-print and reparsing, random code generation);

Glossary

A-structure

The ADL code generated by the Ampersand type checker, used as input for the calculator component.. 6

ADL

Ampersand Design Language. 5

ADL-structure

See A-structure.. 6

Cabal

Library for managing Haskell builds and packages. 16

Dropbox

File hosting service that offers cloud storage, file synchronization, personal cloud, and client software. 15

F-structure

The functional structure generated by the Ampersand calculator, used as input for the different output modules.. 6

GHC

Glasgow Haskell Compilation system. 16

Git

A distributed revision control and source code management. 15

GitHub

Git repository web-based hosting service which offers all of the distributed revision control and source code management (SCM) functionality of Git. 15

Haddock

A software documentation generator for the Haskell programming language. 15

Hpc

Library for checking, recording and displaying code coverage. 16

IDE

Integrated Development Environment. 16

LaTeX

Document preparation system and document markup language for the TeX typeset. 15

Microsoft Office

Office suite of desktop applications devleoped by Microsoft. 15

P-structure

The parse-tree generated by the Ampersand parser, used as input for the type checker.. 6

QuickCheck

Library for testing Haskell code. 16

Sentinel

Test server for the Ampersand project. 16

TeXworks

Graphical user interface for editing and compiling LaTeX documents. 15

yEd

Software for editing graphs. 16