University of Southampton

COMP2212

Programming Language Concepts

# The *HERB* Language User Manual

A Domain Specific Language to solve any conjunctive query.

*Authors:*

*James Towns*

*Elliott Power*

*Module Lead:*

*Dr. Pawel Sobocinski*

April 2018

# Contents

[The *HERB* Language User Manual 1](#_Toc513722911)

[Contents 2](#_Toc513722912)

[1 Problem Domain 3](#_Toc513722913)

[2 Data Types and Manipulation 3](#_Toc513722914)

[2.1 Primitive Variable Declaration 3](#_Toc513722915)

[2.2 Primitive Operations 3](#_Toc513722916)

# Problem Domain

This language’s function is to solve conjunctive queries – first order logic functions that use only relation symbols, equality, conjunction and existential quantifications. This is a part of the set of problems that can be called on queries on relational databases.

# Data Types and Manipulation

The queries in HERB follow a format that is like relational algebra and adds some syntax sugar over the top to allow someone with a mathematical background to easily pick up the language. Therefore, each program is treated as a query that is separate into what is left of the marker, and right of the marker. Therefore: *x1, x2, x3 |- A(x1,x2) ^ B(x2,x3)* is a valid input.

The supported primitive types are: String, Integer, Boolean

The supported commands are: Equality, Conjunction, Existential. Relation

# Primitive Variable Declaration

Every variable must be declared within bounds. Meaning that a variable x1, must have within the query, a relation that contains variable x1. This can be done by defining a Relation as <FILE NAME CHAR AS CAPITAL> <UNIQUE DIGIT 0-9> followed by the relation within curly parentheses.

/\* comments can be declared between these symbols like these \*/

A0{x1,x2} /\* Refers to file A.csv, which contains two columns, x1 and x2 \*/

A1{x1,x2} /\* Relation is declared as A1 – variables declared x1, x2 \*/

True /\* Booleans can be declared with a capital letter True/False \*/

Each instance of a file name (e.g. A) must have a unique ID from 0-9 which will read the file name the head of its string but store its location as unique A0 for each table. This allows for paths of up to cycle 10 and self-referencing with ease.

You must uniquely identify each table with a letter otherwise myinterpreter.hs will throw a lexical error at the given location of the error within your HERB program.

# Primitive Operations

The language supports a marker ( |- ) equality ( = ) , conjunction ( ^ ) , existential ( E. ) and relation. (A1{}). The following are left associative with the following precendence ( |- ) > ( E. ) > ( ^ ) > ( = ) > ( , ) Each query must come in the form:

<Order of output variables> <Marker > <Query>

with queries taking the form of:

<Query> <Operation> <Query>

# Errors