

Name: \_\_\_\_\_

Student No: \_\_\_\_\_

**ELEC 875 Design Recovery and Automated Evolution**

**T.R. Dean**

**March 15, 2010**

Midterm

Aids Allowed: DMM Specification Paper

Time: 90 Minutes

**Instructions: Total 35 marks. Closed Book (DMM only).**

**Answer all questions in the space provided on this sheet**

1.(3 marks) Give a brief (one or two line) description of each of the following terms as it relates to design recovery and the material covered in class.

a. Terminal Symbol

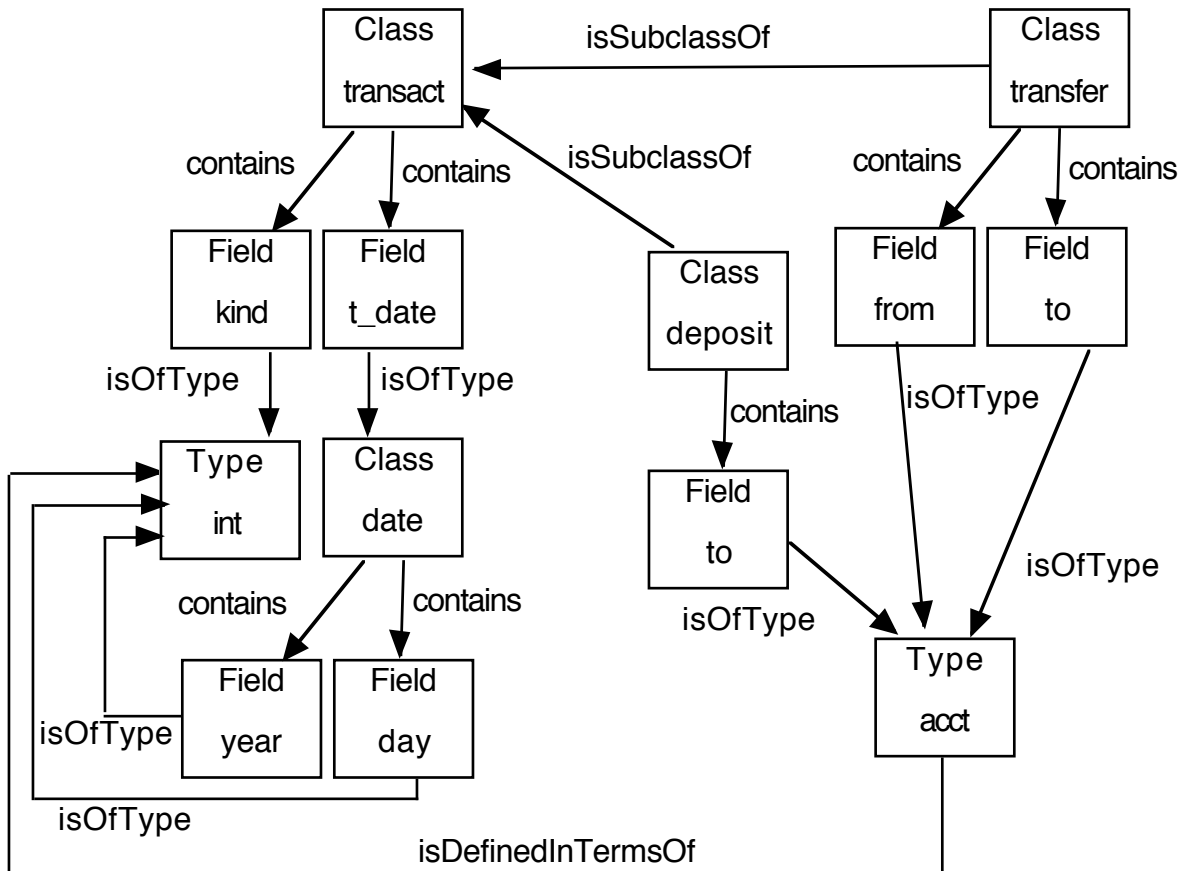
b. Structural Referent of a Comment

c. Concept

2. (6 marks) A common theme in design recovery is the importance of informal information such as naming conventions. The information that is not part of the syntax or semantics of the program. What does informal information give us that the semantics of the language does not? Give references to some of the papers we have covered in class.

3. Consider the following model. The relation `isDefinedInTermsOf` handles language constructs such as `typedef`. So in the model, the `isDefinedInTermsOf` models a C++ statement like:

`typedef int date;`



- a. (2 marks) Write a discrete math expression (relational algebra query) that returns the types of all fields of subclasses of the class 'transact'. If you cannot remember the query language, a list of the relations in the appropriate order will be sufficient.

4. (Cont'd)

b. (2 marks) Semantic grep provides the following types of Queries:

Query Type	Syntax
Entity Query	<i>pattern is entity</i>
Restricted Entity Query	<i>pattern is entity in pattern</i>
Relation Query	<i>pattern is entity &lt;relation&gt; pattern is entity</i>
Restricted Relation Query	<i>pattern is entity in pattern &lt;relation&gt; pattern is entity in</i>
Relational Transitive Closure Query	<i>pattern is entity &lt;relation+&gt; pattern is entity</i>

Use this table to write the query that will return the all fields contained in dates that start with the letter y.

4. (7 Points) Explain the difference between conceptual and concrete architectures. What are some of the reasons for the differences between the two?

5. (2 marks) Another common concepts in design recovery is that of searching. What are some of the problems with conventional searching tools such as grep or the search facility in regular editors.

6. (15 marks) Build a DMM model for the following (incomplete) snippets of C source code:

file socket.h

```
struct socket_addr {
    unsigned long dest_addr;
    unsigned long port;
};
```

file connect.c

```
#include <socket.h>
const int SET_ADDR=5;
extern int ioctl();
int setSockAddr(int sd, struct socket_addr & saddr) {
    return ioctl(sd,SET_ADDR,saddr);
}
```

file client.c

```
#include <socket.h>

int main(){
    int s;
    sock_addr sa;
    ...
    sa.port = 5;
    setSockAddr(s,&sa);
    ...
}
```

7. (Cont'd)

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