Undergraduate Exam

CSE-304 Compiler Design

Fall '97
Final Exam
December 16, 1997

Duration: 2 hours, 45 minutes.

Instructions:
- Read the following carefully before answering any question.
- There are 8 questions in all, in 4 pages, for a total of 105 points. The maximum score is 100.
- For each question, make sure you have enough space to write your answer.
- Write your answers in the examination paper.
- Make sure to indicate your name and ID number on the first page of the examination.
- Each question is worth 15 points unless otherwise specified.
- The examination is scheduled to start at 9:00 AM.
- The examination is closed book.
- Good luck!

<table>
<thead>
<tr>
<th>Question</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Total 10 points</td>
</tr>
<tr>
<td>2.</td>
<td>Total 10 points</td>
</tr>
</tbody>
</table>

GOOD LUCK

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<thead>
<tr>
<th>Question</th>
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<tbody>
<tr>
<td>1.</td>
<td>15 points</td>
</tr>
<tr>
<td>2.</td>
<td>15 points</td>
</tr>
</tbody>
</table>

Describe how you will structure a system to translate LATEX documents to HTML. Explain.

A sample translation of a LATEX document to HTML is shown below:

\begin{document}
This is a sample LATEX document.

A list of bullet items can be created as follows:

\begin{itemize}
\item Start an \texttt{itemize} environment;
\item Place each item in with \texttt{item} command;
\item \texttt{end} \texttt{itemize}.
\end{itemize}

\end{document}

\begin{html}
This is a sample LATEX document.

A list of bullet items can be created as follows:

\begin{ul}
\item Start an \texttt{ul} environment;
\item Place each item in with \texttt{li} command;
\item \texttt{end} \texttt{ul}.
\end{ul}

\end{html}
6. [Total: 15 points]

(a) [3 points] Explain why and method names in Decaf cannot be resolved until types are known. That is, why cannot one determine which entity is represented by a[x]?

(b) [5 points] Explain why and method names in Decaf cannot be resolved until types are known. That is, why cannot one determine which entity is represented by a[x]?

(c) [3 points] Explain why and method names in Decaf cannot be resolved until types are known. That is, why cannot one determine which entity is represented by a[x]?

(d) [3 points] Explain why and method names in Decaf cannot be resolved until types are known. That is, why cannot one determine which entity is represented by a[x]?
8. Total: 15 points

(a) Consider the following grammar G₈ for expressions E:

E → E + E
E → E - E
E → E * E
E → E / E
E → id
E → int

Consider the following grammar G₉ defined by adding:

E → E ! E
E → E = E

Consider the grammar G₈ derived by adding:

F → int
F → id
F → int F
F → id F
F → int F ! F
F → id F = F

Consider the grammar G₉ derived by adding:

C → int C
C → id C
C → int C ! C
C → id C = C

Let d be an instance of class D, and c be an instance of class C. What are the types of c.

(c) ?

(d) ?
Consider the grammar $G^9$ derived by adding to $G^8$ the rule $E → E + E$.

Modify the syntax-directed definition in (b) to include code generation for expressions of the form $x + y$.

The form $x + y$. Undergraduate Exam