Izmir Institute of Technology
Computer Engineering Department
CENG513 Final Exam Spring 2024
Question 4

Student Name: Gökay Gülsoy Student No: 270201072

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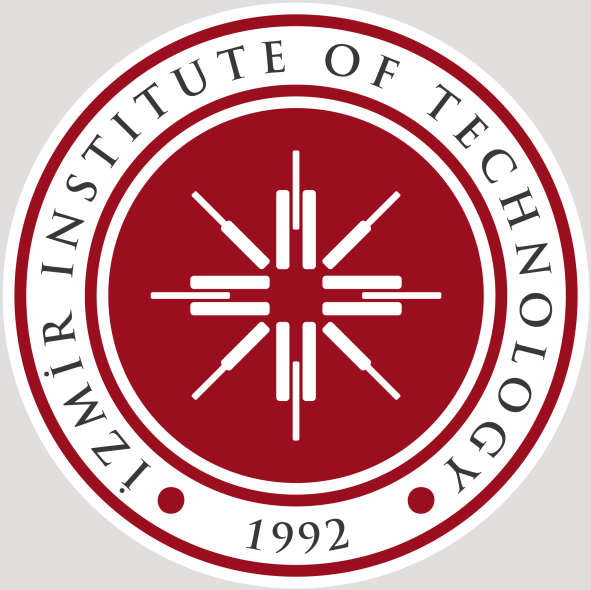

Question 4

Compiler design and construction as a reproducible research field is harder field compared to other research fields in computer science because it requires experience in many other sub fields of computer science such as data structures and algorithms, formal languages and automata theory, and computer architecture which should be practically applied to construction of modern compilers. As far as It can be seen from the paper presentations and available research papers from conferences, most of the research in compiler field is focusing on implementing more robust optimizations via better utilizing the available ISAs provided by modern microprocessors. Testing the performance of proposed optimizations or features correctly become crucial in reproducibility studies, so fundamental characteristics of reproducible research is that results have to be measurable which means that experimental results which were obtained previously should be regenerated with tolerable level of differences in the results. In order to achieve this, researchers who conducted the studies should provide their studies with artifact badges. As in my and other friends papers first page of paper in ACM format usually contains badges that indicate whether artifacts are available and evaluated. If paper contain both of them and required hardware is available research can be reproduced. Practices to facilitate reproducible research are providing the experiment environment in some repository and the step by step instructions related to how experiment can be carried out from scratch. For example, my paper provides a repository from which virtual hard disk image file of an Ubuntu operating system can be downloaded and installed in any virtualization tool such as VirutalBox. This virtual machine contains the experiment environment with all the scripts, source code files, and executable files that can be used to regenerate numerical experiment results and figures. One prominent difficulty that can be encountered in reproducing results is lacking required hardware to carry out the experiment such as in the case of paper called Parsimony presented by our friend Furkan, he was required to use machine with vector instruction support. Another commonly encountered difficulty is that artifacts provided may be mistaken or not updated, so some parts of experiment or even whole experiment can not be reproduced. For instance, our friend Nevzat encountered some typos in some scripts which are used to regenerate the experiment results and had to correct them by checking the project code structure.