UNIVERSITY OF CALIFORNIA
Department of Electrical Engineering
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Computer Science Division

CS 264 **S. L. Graham**
Fall 1995 **A. B. Downey**

Assignment 5: Dynamic Storage Management

Due: Tuesday, 7 November 1995

The purpose of this assignment is to apply what you've learned about dynamic storage management. Please give a hardcopy of your solution to Allen.

1 Make some measurements

Using either your cadaver compiler or some other compiler such as gcc, write a program that infers, by doing a series of malloc and free calls, what the implementation of malloc and free is, given that it may or may not be one of the following:

- a Knuthesque linked-list
- a tree
- power-of-two blocks

Also, infer the allocation discipline (first-fit, first-fit- with-clock-pointer, best-fit, worst-fit, whatever). Run your program and report the results.

2 Investigate Dynamic Storage in Your Cadaver

Study the way dynamic storage management is done in your cadaver compiler and relate it to the material discussed in class. (If you used your cadaver for the experiemnt above, relate the results to what you learn by reading the code or documentation). Following are some examples of issues that would be interesting to discuss. You should add any others that you discover or that you think are relevant.

- What language features in the source language for your cadaver use dynamic storage allocation that is not stack-based? (If none, answer the questions for some compiler you have used in other classwork that does have some sort of dynamic storage management.)
- Explain how allocation is done (if via malloc, investigate the implementation that is actually used — don't just rely on what Zorn says).
- Explain how storage re-use is achieved.

- Is there a way to monitor the performance of dynamic storage system on the programs you run? Explain. Is there a way to tune the performance for a given application? If so, how?
- Give an example of a program that would behave badly under the dynamic storage mechanism(s) available for the cadaver.
- How could the dynamic storage aspects of the cadaver be improved, and how easy would it be to replace the current dynamic storage system with a different one?