

CSC-215
Advanced Computer Organization
Basic logistics

Dr. Chuck Cartledge

January 17, 2017



Table of contents I

1 Logistics

2 Concepts

3 Goals

4 Vita

5 Conclusion

6 References



How we'll get along.

- Be on time.
- Be polite.
- Break about mid-way.





What the class will cover?

And not cover.

- This is a course to explore components that live on a motherboard
- You will become familiar with a motherboard
- Each assignment will require that you look at a different aspect of the motherboard





Yes, there will be assignments.

Each assignment will be to solve a “reasonable” question in the time available.

- A different assignment for each part of the motherboard
- A short paper at the end of each chapter
- There will be exams
- Final will be during the last class period

Ensure that your work is yours.

Socratic method (part of your grade).

“The Socratic method includes the use of systematic questioning, inductive reasoning, universal definitions, and a disavowal of knowledge.”

J. C. Overholser [3]

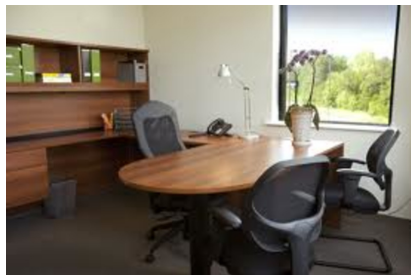


Figure: “Just one more question.
...”



All virtual.

- Mondays and Fridays from 4 to 5 PM
- Google Plus/Hangout and Skype accounts as “Chuck Cartledge”
- Or contact me about alternative times



What kind of students are we?

Domain	Range	CSC-215
Age	< 20	4
	20 – 29	17
	30 – 39	2
	40+	
Languages	1	15
	2 – 3	4
	4+	1
Yrs. Exp.	< 3	20
	4 – 6	4
	7 – 9	1
	10+	





How long is the coast of the Britain?

- Question raised by Richardson [4]
- Popularized by Mandelbrot [2]
- Foundational question in Chaos Theory [1]



Varies from $\approx 2,400$ to $\approx 3,400$ km depending on your yardstick.
(http://en.wikipedia.org/wiki/How_Long_Is_the_Coast_of_Britain)



Curves that look like themselves.

- Richardson derived:
 $L(G) = MG^{1-D}$
- It was ignored
- D is the dimensional characteristic [2]

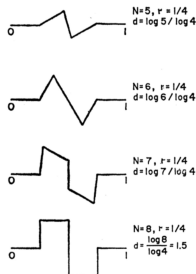
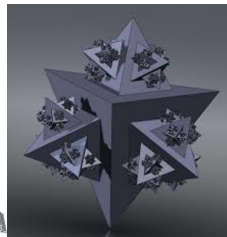
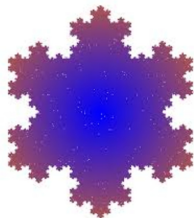
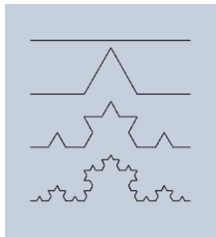


Fig. 2. Nonrectifiable self-similar curves can be obtained as follows. Step 1: Choose any of the above drawings. Step 2: Replace each of its N legs by a curve deduced from the whole drawing through similarity of ratio $1/4$. One is left with a curve made of N^2 legs of length $(1/4)^2$. Step 3: Replace each leg by a curve obtained from the whole drawing through similarity of ratio $(1/4)^2$. The desired self-similar curve is approached by an infinite sequence of these steps.



Koch curves

Simple algorithms yield things of beauty.

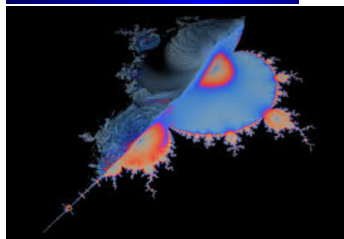
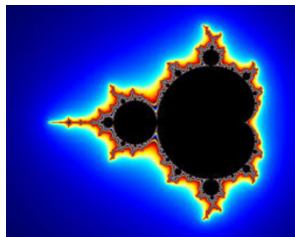


Mandelbrot curves

In 2 and 3D.

- Mandelbrot's equation:

$$z_{n+1} = z_n^2 + c$$
 where c is complex
- Mandelbrot curve is self referential



How applicable to computer architecture?

Now we go down the rabbit hole.

With Koch and Mandelbrot, we were looking deeper and deeper. What happens if we go higher instead of deeper?

Concept	Computer	Big Data
Paralizable	Cores	Processing nodes
Data locality	Cache (L1, L2, etc.)	HDFS
Coordination	OS	Hadoop
Output	RAM	HDFS

We will be bringing these ideas out into the open.



Where are we (as a class) now?

We each have some level of knowledge.

Some of this data is captured in the “Demographics” slide.

- Programming ability
- Analytic ability
- Writing ability



We will progress as a group to the goal.

Expectations based on labor union hierarchy model.

Hierarchy is a reflection of training and an indicator of expectations.

Level	Expectation	Academic equivalent
Apprentice	Basic skills, assist as needed and possible, learn, become productive	Bachelor
Journeyman	Skilled, completed formal training, trains Apprentices, requires general directions	Masters
Master	Specialist, highly skilled, requires minimal direction or guidance	PhD



Who am I?

- Father
- Husband (only 40 years, but it seems longer)
- PhD, Computer Science, 2014
- CAPT, USN retired 2004 (31+ years)
- Professional software developer (38 years)
- A perennial student
- 1st computer: 1970, donated ICBM guidance computer, machine code, paper/mylar tape, and drum memory



Interests: autonomic systems, real-time applications, distributed processing, long-term preservation of digital data, Big Data



What have we covered?

- Class logistics
- Course overview
- Chaos concepts





References I

- [1] James Gleick, Chaos: Making a new science, Random House, 1997.
- [2] Benoit B Mandelbrot, How long is the coast of Britain, Science **156** (1967), no. 3775, 636–638.
- [3] James C. Overholser, Elements of the socratic method: V. self-improvement, Psychotherapy: Theory, Research, Practice, Training **33** (1996), no. 4, 549.
- [4] Lewis F. Richardson, The problem of contiguity, General Systems Yearbook **6** (1961), 139–187.