CMG 2007, San Diego, CA

Session 511, Paper 7050, Dec 3, 2007

Seeing It All at Once with Barry

Better Performance Through Better Visualization

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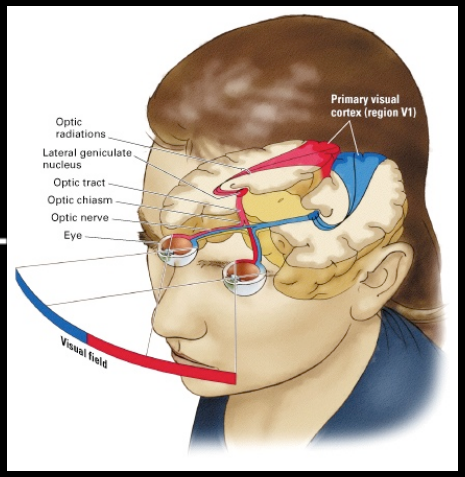
The Problem

This talk is just an overview. All the technical details are in our paper. It is not an easy read!

The PerfViz Problem

Best impedance match between the digital and cognitive computer?

L?



Better performance through better visualization

Performance Visualization

- Is it possible to present performance data collected from modern complex computing environments in a way similar to that of scientific visualization applied to complex physical data?
  - Why should the physicists have all the fun?
- We'll call this goal "PerfViz" for short
  - Some PerfViz already exists
  - Can we do better?
  - Is anyone REALLY trying?

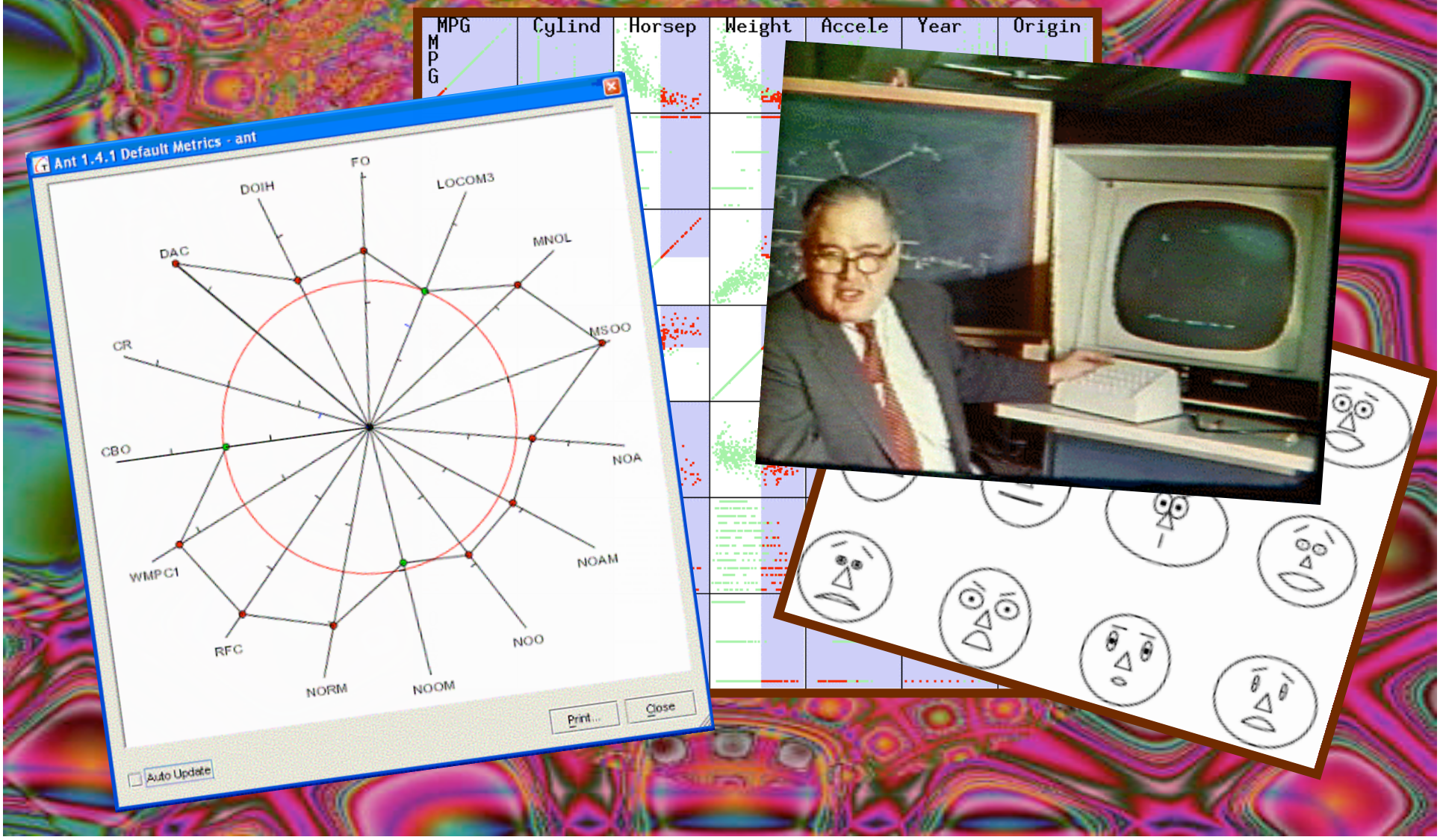
What Makes PerfViz Hard?

- We know next to nothing about cognition
- We don’t even understand the brain’s visual circuitry very well
- Performance data is not 3+1 dimensional, but N-dimensional!

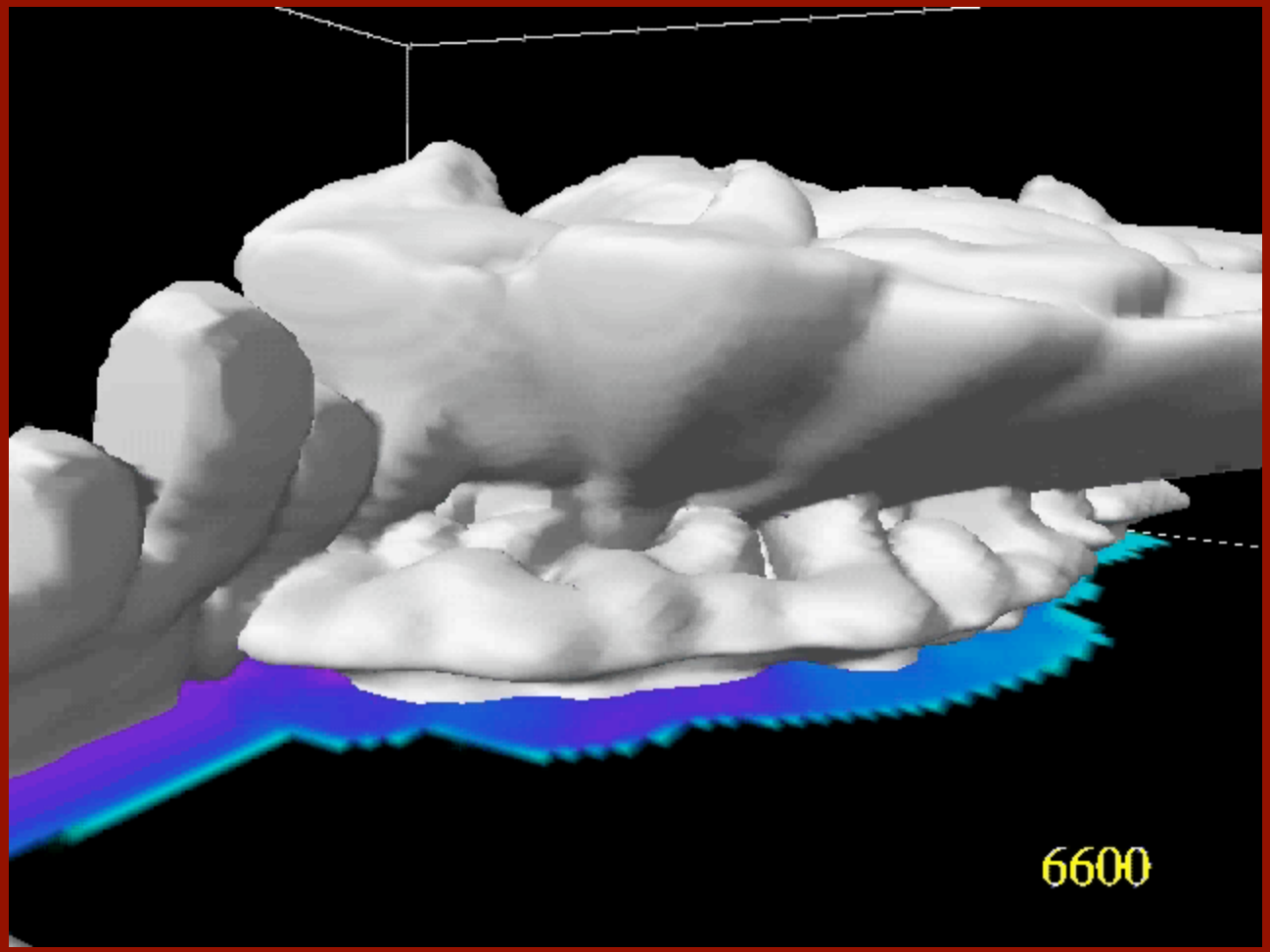
Role Models

Who else has solved similar problems?

1970's Visualization Tools



SciViz in (3+1)-Dimensions



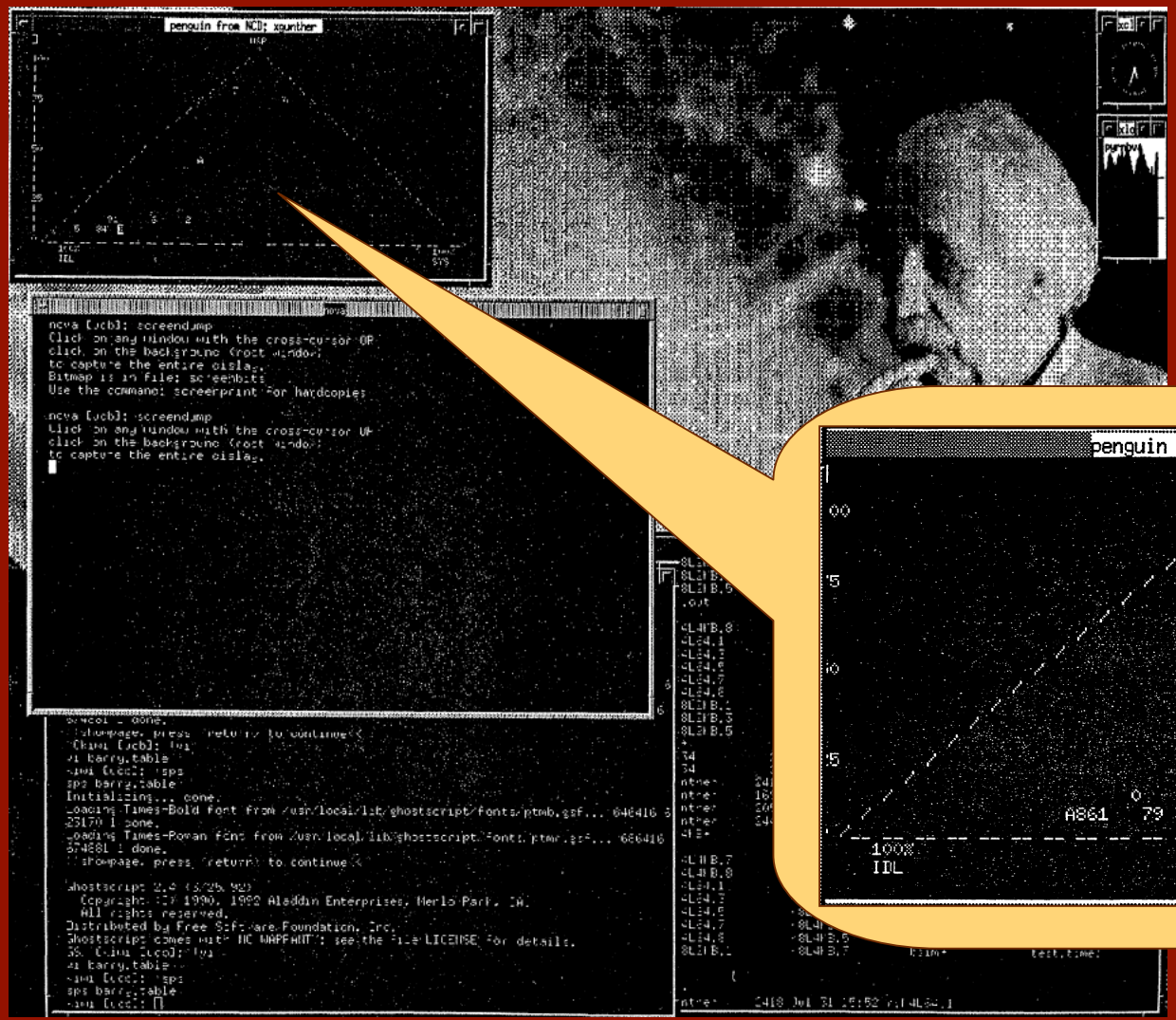
C21 PerfViz Tools

C21 InfoViz Tools

PerfViz

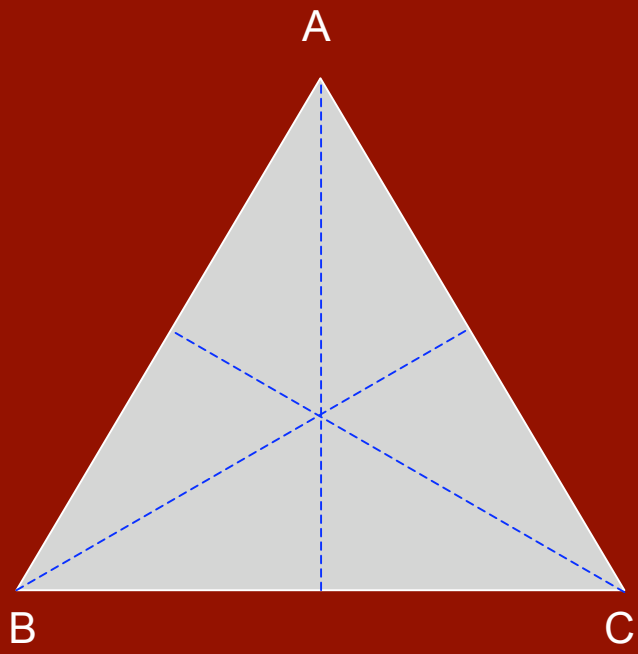
How can we represent many metrics from multiple source (e.g., 100’s of servers) with a good cognitive impedance match for the performance analyst?

NJG Develops *Barry* in 1992



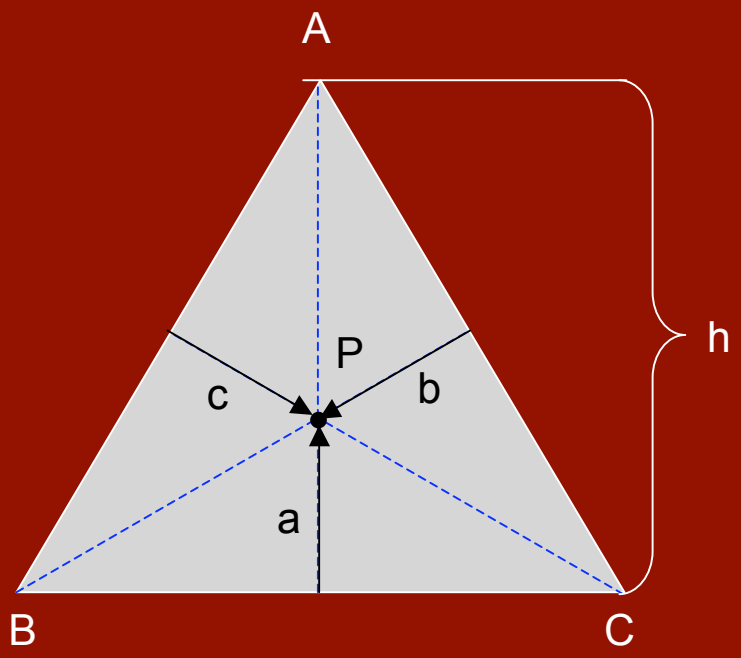
My X11 desktop

Some Facts About Triangles



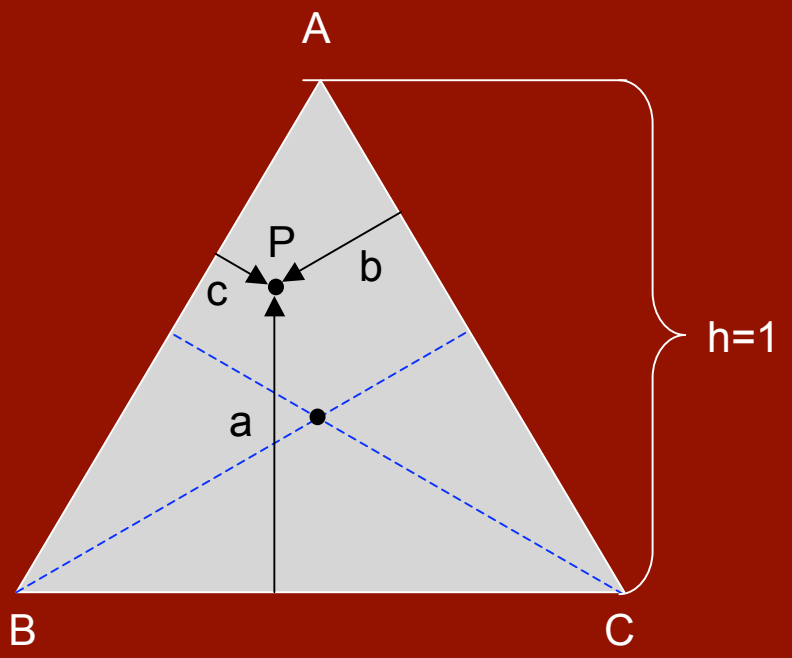
- Consider only equilateral Δ (each interior angle = 60°)
- For Δ sides of length 2, height h = $\sqrt{3}$
  - For Δ sides of length 1, height h = $\sqrt{3}/2$
  - For Δ sides of length $2/\sqrt{3}$, height h = 1
- Bisector of each side also bisects opposite interior angle (30°)

The Centroid



- *Centroid* (P) or “center of gravity” is 1/3rd height of the Δ (h)
- By symmetry, centroid is 1/3rd length of each bisector (b and c)
- We see: a + a + a = h and also know b = c = a
- Therefore: **a + b + c = h** (sum rule)

Barycentric (Barry-3) Point

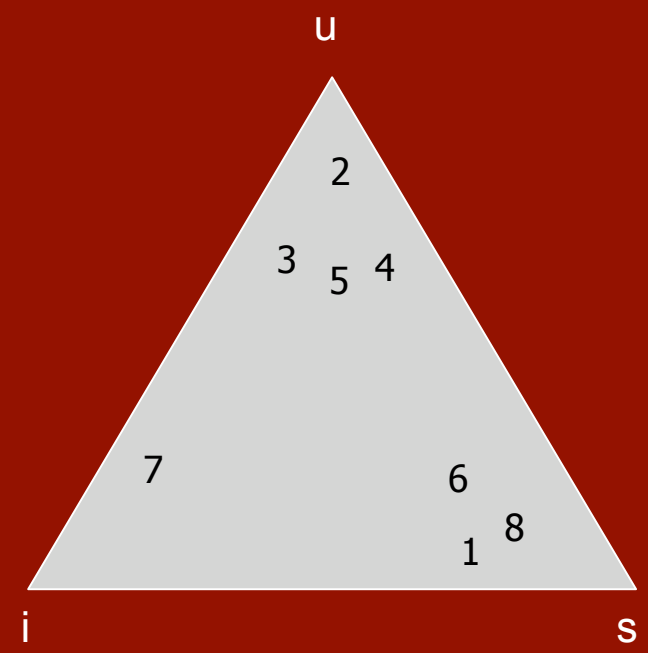


- Even if point P is moved away from centroid
  - Sum rule: a + b + c = h still holds
  - True for any point inside the Δ
- Choose h = 1 as a convenient normalization
- Any 3 metrics that sum to 1 can mapped to Barry-3

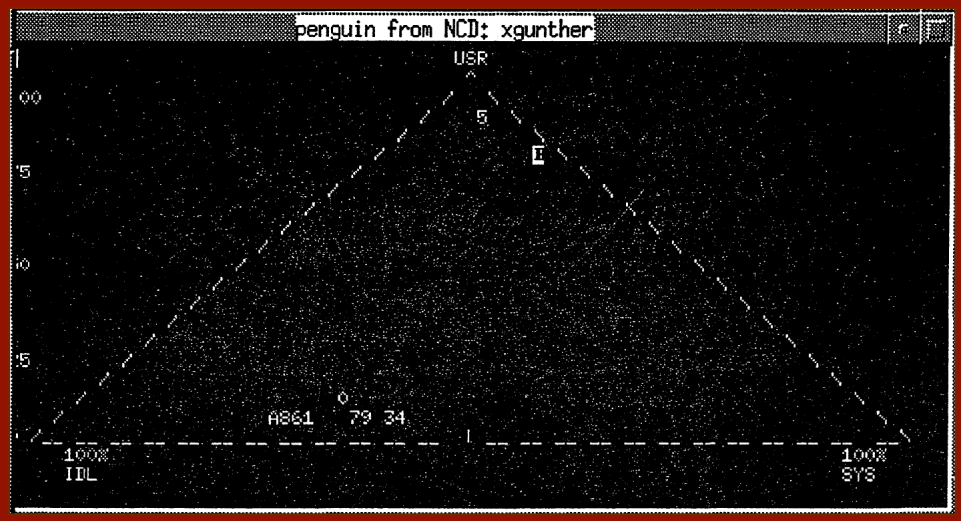
CPU Busy in Barry-3

- Assume the triangle is of height 1 or 100%
- Let each of the 3 legs represent:
  - user time (u)
  - system time (s)
  - idle time (i)
- Sum rule: u + s + i = 1
- Any point inside triangle is now defined by {u, s, i}, the %CPU busy

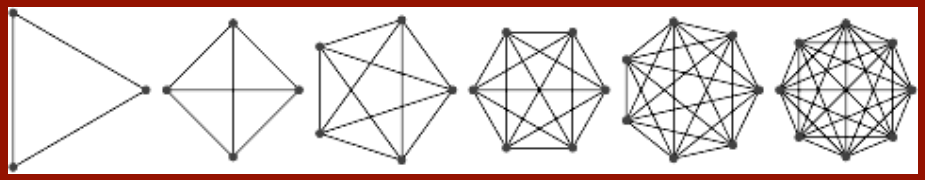
Multiprocessor in Barry-3

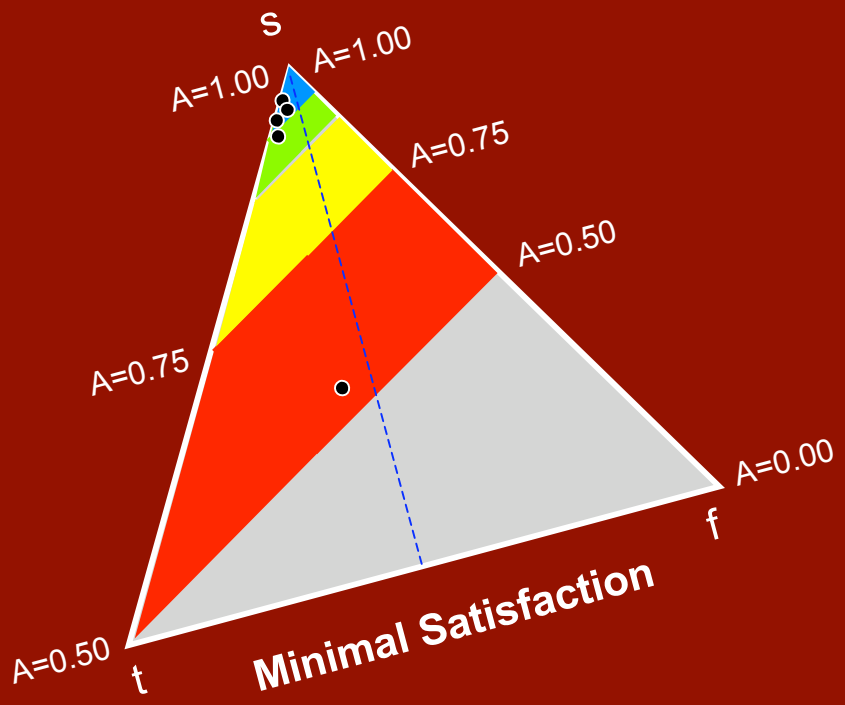


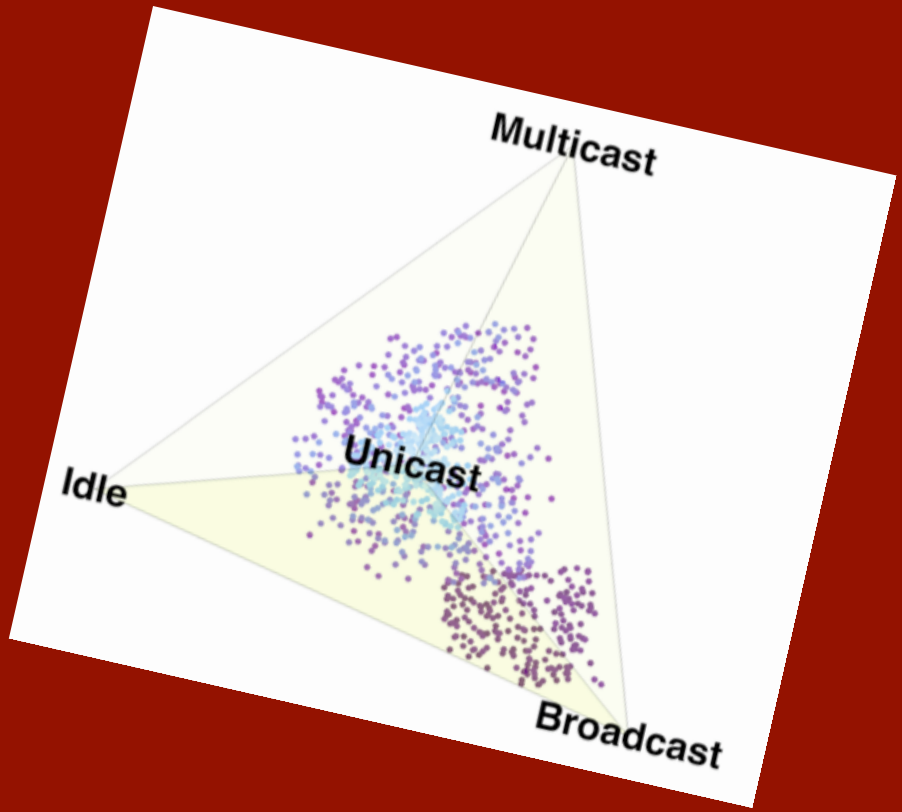
- Shows many CPUs at once
- Visual area is essentially independent of CPU number
- Easy on the eyes. Trigger off peripheral vision
- Updated periodically for dynamic clustering cues



Generalizations







Other PerfViz Talks @ CMG

- "*Death to DashBoards*"
  - McMahon & Martin
  - Session 346, Tue @ 2:30pm
- "*Triangulating Apdex Index with Barry-3*"
  - Gunther & Jauvin
  - Apdex sub-Conf, Session 54, Wed @ 4pm
- "*Seeing It All at Once with Barry*"
  - Gunther & Jauvin
  - CMG Proc and CD

How We Got Here

- Thanks to:
  - Guerrilla alumnus J. Scott Johnson for bringing the Apdex metric to my attention
  - Peter Sevcik for providing us with some Apdex measurements
  - Bob Sneed and Tim Cook from Sun for providing 72-way CPU data
- Now, over to Mario for the fun stuff …