Analysis of UNC Session Data

Presented 3/17, 3/24 and 3/31, 2000

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Packet Times and Sizes for single TCP Sessions

5 Sessions at “Off Peak” times

5 Sessions at “Peak” times

View 1 of UNC Session Data

Following “session trace” visualization:

Number of bytes accumulated over time

Show tops of SessionData3p1d1.ps … SessionData3p1d10.ps

Notes:

1. TCP window steps dominate

2. Occasional “long delays”

3. Sometimes long lags “before starting” and “after finishing”

4. Almost all but first and last packets are 1500 bytes.

View 1 of UNC Session Data (cont.)

Truncated versions:

Show bottoms of SessionData3p1d1.ps … SessionData3p1d10.ps

- Cut off first 44 byte packet (ignoring possible long server lag)
- Cut off possible initial 40 byte packet
- Cutoff trailing 40 byte packets (saw up to 3)

Consider only these for rest of analysis

Reduce scope to "5 most representative":

Off Peak: 1, 3   Peak: 1, 2, 4

View 2 of UNC Session Data

Byte Rates

Interpolations:

Show ConsCasc\EGConsCasc1int.ps

1. Midpoint

2. Time (equally spaced)

3. Size (equally spaced)

Sometimes important difference: spacings

View 2 of UNC Session Data (cont.)

Byte rates:

Show SessionData3p11d1.ps, SessionData3p11d3.ps, SessionData3p11d6.ps, SessionData3p11d7.ps, SessionData3p11d9.ps

Specifics:

Off Peak 1: TCP windowed bursts + long delays

Off Peak 3: Regularly increasing rate

Peak 1: TCP window bursts

Peak 2: Reg. inc. + TCP win. bursts

Peak 4: TCP win. bursts + short del's

View 2 of UNC Session Data (cont.)

Byte rates:

General Points:

1. 3 interpolations similar to each other

2. Size Interp. most similar to Inverse CC

Show ConsCasc\EGConsCasc2v3d1.ps

3. Too much “periodicity” for CC???

4. Consider hybrid models?

View 3 of UNC Session Data

CC Generator Distributions

Off Peak Session 1:

Again show SessionData3p1d1.ps

Time Interpolated:

Show SessionData3p12d1.ps, SessionData3p12d1j.ps and SessionData3p12d1s.ps

- s.d. decr. at finer scale (interpolation)
- many gen's at 0.5
- correlation across scales??

View 3 of UNC Session Data (cont.)

Off Peak Session 1:

Size Interpolated:

Show SessionData3p13d1.ps, SessionData3p13d1j.ps and SessionData3p13d1s.ps

- Overall similar lessons (dominated by interpolation effects)
- Scatterplot has “dynamical system part”?
- Size Interp’d has “fewer at 0.5”
- Thus “better model”
- Simulate from mix of unif. and 0.5?
- Decent model

View 3 of UNC Session Data (cont.)

Other traces not so different:

Show CombineSessionData1p12j.pdf and CombineSessionData1p12s.pdf

All are available at usual web site

http://www.unc.edu/depts/statistics/postscript/papers/marron/NetworkData/UncSessionData/

Quick Attempts at Simulation

Recall given traces

Can conveniently page through these using CombineSessionData1p1.pdf

Attempt 1: Gen's = Unif(0,1)

Direct:

Show ConsCasc\ EGConsCasc6d1i1.ps

- "too flat and steep" not regular?

Inverse:

Show ConsCasc\ EGConsCasc6d1i2.ps

- similar"

Attempt 2: Gen's = ½ Unif(0,1) + ½ 0.5

Direct:

Show ConsCasc\ EGConsCasc6d2i1.ps

- diagonals + flats? Good?

Inverse:

Show ConsCasc\ EGConsCasc6d2i2.ps

- too vertical

Attempt 3: Level-Wise mix, Unif(0,1) 0.5

Direct:

Show ConsCasc\ EGConsCasc6d3i1.ps

- more flats? Better

Inverse:

Show ConsCasc\ EGConsCasc6d3i2.ps

- too vertical

Attempt 4: L-W mix, U-shaped & 0.5

Direct:

Show ConsCasc\ EGConsCasc6d4i1.ps

- Too much change near ½

Inverse:

Show ConsCasc\ EGConsCasc6d4i2.ps

- too flat near ½

Attempt 5: L-W mix, Unif, U-shaped & 0.5

Direct:

Show ConsCasc\ EGConsCasc6d5i1.ps

- too steep

Inverse:

Show ConsCasc\ EGConsCasc6d5i2.ps

- too flat?

Should Pursue Further?

1. Dynamical Systems approach to scatterplots

2. Attempts at “better” simulations (including improved criteria)

3. Tools for “CC summaries of traces”

4. Tools which replace CC approach by “simple statistics”?

5. Tools which replace CC approach by Markov process type modelling