TCP/IP for VSE
The Last Word in Performance

Presented by John Rankin
CSI International
Phone: (800) 795-4914
Web: HTTP://WWW.e-VSE.COM

Agenda

- General Discussion
  - Performance Tuning
  - Data Flow
- Performance
  - Network
  - Stack
  - Applications

Performance Tuning Steps

- Isolate your performance problem
  - Collect Symptoms
  - Collect Data
- Create performance theory
  - Matching symptoms to the theory
- Adjust performance controls
  - Testing the theory
  - re-adjusting as necessary

TCP/IP Collection Facilities

- SET DIAGNOSE=PERFORM
  - Performance of specific connections
- QUERY STATS
  - Overall System Statistics
- QUERY IPSTATS
  - Cumulative statistics by IP address
- SET RECORD=FULL
- QUERY FRAGMENT

Life of a Datagram

- To understand performance, you must understand how data flows through the network and subsequently through TCP/IP
  - An application such as FTP
  - The TCP/IP engine
  - A TCP/IP link driver
  - The network
  - And back again

Performance is Flow of Data

- Performance is divided into three areas:
  - Network Data Flow
    - Ethernet, token-ring, etc.
  - Stack Data Flow
    - TCP, UDP, IP, etc.
  - Application Data Flow
    - FTP, Telnet, LPR, etc.

Network Data Flow

- Network Connections
  - Type of Connection
  - Type of Conduit
- Flow of the actual information
  - Large to smaller pipe considerations
  - Fragmentation

Control Unit Considerations

- Integrated adapters
  - General performance
  - Sharing Token-ring with SNA
- The CLAW interface
  - Cisco Router with CIP card
  - Channel attached RS/6000
- The Open Systems Adapter

The LAN Station Controller

- Devices
  - IBM 3172/OSA
  - OEM such as Netshuttle for VSE 10mbs
  - IBM 2216 100mbs
- Throughput
  - Theory
  - Control
- Multiple control units

OSA Express Adapter

- Specialized Interfacing
- Full IP packet transfers
- Performance
  - Maximizes Packet Transmissions
  - Reduces fragmentation
  - Improves operation overlapping

Hyper Sockets

- Hybrid operating interface
- Low Level Hardware interface
- Performance
  - Extremely Fast and high volume
  - Maximize transmission size
  - 64k IP datagrams.
  - Maximum TCP transmission size

Retransmission

- What is happening in TCP/IP to cause this to happen
  - The theory
  - The practice
- Performance
  - How can it be measured
  - How can it be effected
- SET FIXED_RETRANS = ON or OFF

Ethernet

- Datagram size 1500
- Considerations
  - Data collision problems
  - Types of physical wiring
  - Size of local network

Token-Ring

- Datagram size 2000-8000
- Considerations
  - Multiple Ring Considerations
  - Different ring segment flow restrictions
  - Size of local network
  - Data collision problems

Direct connection of Router

- CISCO or RS/6000
  - Although the MTU size is large the overall destination may require a smaller MTU size
- CTCA for VSE or VM
  - Tremendous control can be managed over the MTU size in the specific direction of flow

Hyper Sockets

- 64K mtu size
- Pass the maximum data across to Linux
- Properly identify the final destination
  - Multiple Link definitions depending

Fragmentation

- IP Datagrams can be larger the can fit across a connection
  - Fragmentation creates
    - Overhead at outbound time
    - Overhead at inbound time
  - Can be eliminated if attention is paid
    - MTU size in relation to the direction of flow
    - Always pass a larger MTU size to a smaller one

Stack Data Flow

- Data Units
  - The breaking of data into transmission units
  - The grouping of these units into transmission chunks
- Flow Control
  - How is the flow managed
  - How is the flow impeded
  - How is the flow maximized

Transmission

- MTU (Maximum transmission unit)
  - What does it mean
  - How does it effect the network
- TCP segments
  - What is a segment size
  - How does it effect the network

TCP Windows

- Theory
  - Exactly what is a window
  - How does it control data transfers
- Performance
  - SET WINDOW
  - SET WINDOW_DEPTH
  - SET WINDOW_RESTART
  - SET CLOSE_WINDOW

Silly Window Syndrome

- General TCP/IP buffered implementation
  - Fixed buffer is the size of WINDOW
  - Window decreases as data is read from the buffer
  - Once a close window has occurred.
- Performance
  - SET ADDITIONAL_WINDOW

Application Flow

- Far more tradition in tuning
- Network data arriving and departing
  - Controlled by size and number of buffers
- Directly effected by performance of I/O devices

FTP Performance of Files

- Sequential disk
  - Variable
  - Fixed
- VSAM
  - ESDS
  - KSDS
- Power
- Custom Built

FTP Performance Considerations

- CPU utilization
  - Objective
  - Controls
- Using set maximum_buffers
  - Theory
  - Practice
  - Control over CPU

FTP Performance Controls

- Transfer knobs
  - SET TRANSFER_BUFFERS
  - SET MAXIMUM_BUFFERS
  - 1.5B, Set by daemon definition
- List of things to check when CPU is high
  - TCP/IP partition utilization
  - Network utilization
  - VSE machine utilization
- Running more then one TCP/IP partition

FTPBATCH for Multi-processors

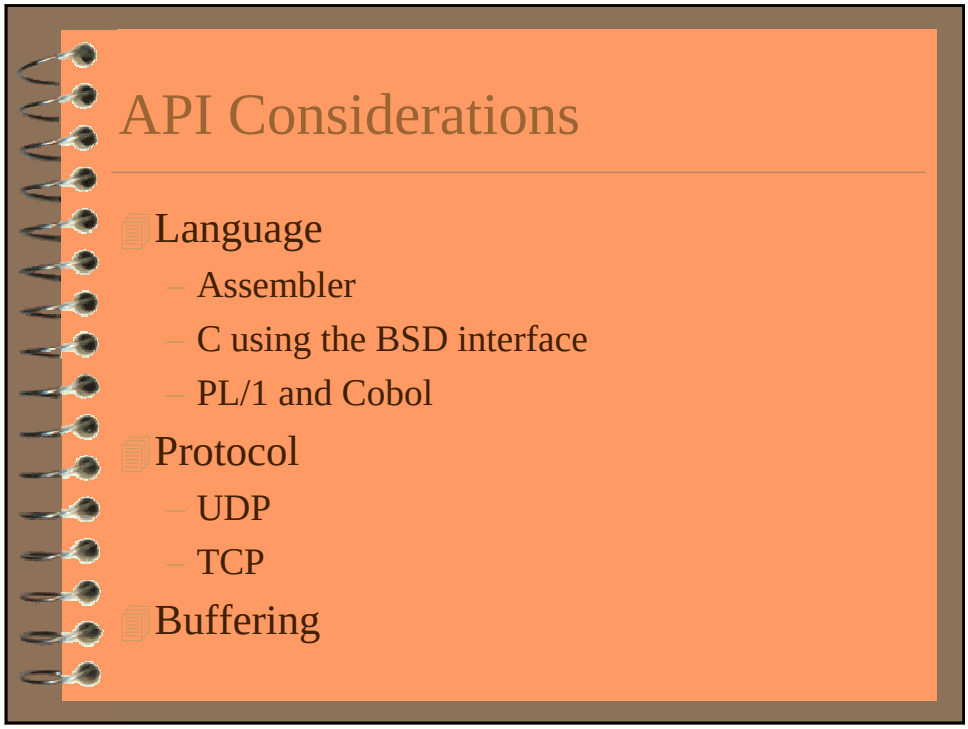
- Allows greater used of multiple processors
  - Concurrent I/O activity
  - Concurrent Buffer creation and processing
- SET BUFFSIZE nnn
- SET BUFFMAX nnn

TN3270 Performance Considerations

- Telnet buffers
  - Pooled telnet daemon
  - Non-pooled telnet daemon
- CPU utilization
  - Telnet daemon flow
  - Effect of larger number of daemons
- CAF performance enhancements
  - VTAM elimination
  - CPU reduction

TN3270 Performance Controls

- Number of defined daemons
- Sequence ordering
  - Unordered definitions
  - Specific definitions
  - Forced connections
- The use of FULL_SCAN
- Control with POOL=YES and POOL=NO


API Considerations
Language
Assembler
C using the BSD interface
PL/1 and Cobol
Protocol
UDP
TCP
Buffering