Module 1: Sterling B2B Integrator Logging Architecture

Understanding the Foundation of System Visibility

- **Comprehensive Logging Framework:** Sterling B2B Integrator employs a multi-layered logging architecture that tracks all operational activities, offering audit trails, compliance data, and diagnostic insights.
- **Log File Types & Locations:** System generates multiple log categories—noapp.log, system.log, wrapper.log, wf.log, and adapter-specific logs—stored under install_dir/logs with automatic rotation and archival.
- **Configurable Log Management:** Administrators can modify log creation, retention, and size limits via customer_overrides.properties and UI-based configuration tools.
- **Diagnostic Significance:** Logs are central to identifying system behavior anomalies, tracking execution flow, and supporting incident resolution across distributed Sterling environments.

Key Log Files in Sterling B2B Integrator

Understanding Core Log Types and Their Diagnostic Roles

noapp.log
Captures core application-level messages including startup, cluster communication, and system errors. Essential for initial troubleshooting during system failures.

system.log
Primary system activity log recording resource events and operational transactions. Used for overall health monitoring and diagnostics.

wrapper.log & wf.log
Wrapper.log logs JVM process lifecycle events, while wf.log tracks business process execution—critical for tracing workflow-level issues.

Perimeter.log & OPS_SCI.log
These logs focus on adapter communication and orchestration. Ideal for debugging connectivity and integration layer events.

Log Configuration and Management

Customizing Log Settings for Efficient Monitoring

UI-Based Configuration
Administrators can modify logging parameters directly through the Sterling B2B Integrator interface: Administration → Operations → System → Logs.

Properties File Customization
The customer_overrides.properties file allows fine-grained control of log creation, rotation, and retention policies for each log type.

Log Retention and Purging
Automatic purging removes old logs once limits are exceeded. Manual archiving is recommended for long-term storage or compliance.

Changing Log Directory
Log file location can be modified in sandbox.cfg; changes applied using setupfiles.sh followed by system restart.

Viewing and Analyzing Log Files

Techniques for Accessing and Interpreting Log Data

- **Access via UI:** Use Administration → Operations → System → Logs to view active and archived logs with filtering by type, node, and time window (limited to 2500 lines).
- **File System Analysis:** For full access, navigate to install_dir/logs via SSH to inspect complete log files using tools like tail, grep, and sed for targeted analysis.
- **Error and Warning Extraction:** Search for specific events with commands such as grep 'ERROR|WARN' to identify recurring issues and correlate across multiple logs.
- **Message Parsing and Patterns:** Understand log message structure—Scope, Subsystem, Name, Information, and Error Code—to identify the source and severity of operational issues.

Module 2: Troubleshooting Business Processes & Adapters

Systematic Diagnostic Techniques for Sterling B2B Integrator

- **Understanding Business Process States:** Gain familiarity with execution states such as Active, Queued, Waiting, Interrupted, and Terminated to identify the current lifecycle of a process.
- **Root Cause Analysis:** Use logs, error codes, and state transitions to isolate the source of process or adapter failures within Sterling B2B Integrator.
- **Diagnostic Tools:** Leverage the System Troubleshooter, Business Process Detail Page, and Performance Statistics Report for process-level insights and queue efficiency analysis.
- **Adapter Troubleshooting:** Develop a framework for diagnosing communication, configuration, and certificate-related issues across adapters such as HTTP, FTP, Connect:Direct, and database adapters.

Business Process States and Transitions

Lifecycle and Recovery Options in Sterling B2B Integrator

- **Execution States:** Processes move through states such as Active, Queued, Waiting, Completed, and Terminated—each representing a specific execution phase or condition.
- **Interrupted and Halted States:** Interrupted_Auto and Interrupted_Man states reflect system shutdowns or runtime errors; processes can be resumed or restarted depending on recovery level.
- **Recovery Levels:** AUTO_RESUME allows automatic continuation post-restart, MANUAL requires user intervention, and NONE disables recovery entirely.
- **Operational Control:** Administrators can perform actions like Halt, Resume, Expedite, or Terminate directly from the Business Process UI or System Troubleshooter.

Troubleshooting Tools and Reports

Leveraging Built-in Diagnostic Capabilities

- **System Troubleshooter:** Centralized utility for monitoring process usage, queue efficiency, and process states with direct action controls for Restart, Resume, or Terminate.
- **Business Process Detail Page:** Provides step-by-step visibility of execution including service names, timestamps, and error messages—critical for pinpointing process failures.
- **Performance Statistics Report:** Aggregates key performance indicators such as average processing time, queue utilization, and thread performance to identify systemic bottlenecks.
- **Integrated Actions:** Administrators can perform live interventions on running processes, improving system stability without requiring downtime.

Adapter Troubleshooting Framework

Structured Methodology for Resolving Communication Issues

- **Identify the Affected Adapter:** Determine which adapter or service is malfunctioning by analyzing business process logs and error messages for specific adapter identifiers.
- **Collect Configuration and Logs:** Export adapter configuration, capture relevant logs (e.g., Perimeter.log, cdinterop.log), and verify connection parameters and credentials.
- **Enable Verbose Logging:** Increase log verbosity to TRACE or ALL for detailed insight into data exchange, handshake errors, or SSL issues.
- **Perform Root Cause Verification:** Use network traces, CPU/memory monitoring, and SSL trace logs to identify external dependencies or resource exhaustion affecting adapter behavior.

Module 3: Queue Management and Execution Threading

Optimizing Process Scheduling and System Throughput

Queuing Model Overview
Sterling B2B Integrator manages business process execution through queued and non-queued modes to balance load and enhance scalability.

Queue Watcher Utility
Provides real-time visibility into queue depth, thread usage, and waiting processes—key for identifying performance bottlenecks.

Thread Allocation
Each queue has configurable minimum and maximum threads, supporting parallel execution while maintaining system stability.

Dynamic Tuning
Queue parameters such as AE_ExecuteCycle and AE_MaxContexts can be adjusted dynamically to optimize resource utilization.

Queue Watcher and Monitoring

Real-Time Visibility into Queue and Thread Utilization

Access and Overview
Queue Watcher provides detailed metrics on active threads, waiting processes, and queue depth through an interactive web dashboard.

Key Metrics
Displays Min/Max thread counts, active threads, waiting process IDs, and queue-specific load conditions for proactive tuning.

Diagnostic Insights
Stack trace analysis helps identify blocked threads and hung processes, enabling precise troubleshooting of performance bottlenecks.

Cluster and Adapter Views
Monitor adapter states (stateful/stateless), database pools, and cluster multicast data for comprehensive system awareness.

Queue Configuration and Tuning

Adjusting Execution Parameters for Optimal Performance

- **Configurable Parameters:** Administrators can fine-tune AE_ExecuteCycle, AE_MaxContexts, AE_ExecuteCycleTime, and MaxWaitTime to control execution cycle length and resource usage.
- **Dynamic Adjustments:** Queue parameters can be modified in real-time through Queue Watcher without restart; permanent changes require updates in customer_overrides.properties.
- **Thread Pool Management:** Each queue's min/max thread settings define concurrency limits and prevent process starvation across multiple queues.
- **Best Practice Guidelines:** Use lower AE_ExecuteCycle values for real-time workflows and higher for batch processing. Monitor CPU/memory utilization to balance throughput and stability.

Queue-Related Performance Issues and Resolution

Identifying and Correcting Execution Bottlenecks

High Queue Depth
Occurs when waiting processes exceed available threads due to slow services or insufficient thread allocation. Solution: increase MaxThreads or optimize services.

Thread Starvation
Long-running or blocked threads prevent new processes from executing. Use stack trace analysis to locate the cause and restart affected threads or services.

Uneven Queue Utilization
Workload imbalance across queues can degrade performance. Redistribute max thread values or reassign business processes to balance load.

Performance Tuning Workflow
Baseline → Identify bottleneck → Adjust queue parameters → Monitor → Persist configuration in customer_overrides.properties.

Module 4: Thread Tuning & Monitoring

Enhancing System Stability and Performance Through JVM Optimization

- **Thread Architecture Overview:** Understand how Sterling B2B Integrator utilizes business process, system, and adapter threads under the JVM for concurrent operations.
- **Thread Pool Configuration:** Learn to manage global and queue-specific thread pools, define min/max thresholds, and apply fairness policies for balanced execution.
- **Thread Monitoring Techniques:** Use Queue Watcher, thread dumps, and OS-level tools (top, ps, jstack) to detect blocked, hung, or resource-intensive threads.
- **Performance Optimization:** Tune thread stack sizes, memory allocation, and garbage collection strategies to achieve consistent throughput and low latency.

Thread Monitoring and Analysis

Detecting and Resolving Thread-Level Performance Issues

Queue Watcher Integration
Provides system-wide view of active, waiting, and blocked threads; enables immediate detection of thread saturation or contention.

Thread Dump Analysis
Captures real-time state of all JVM threads, helping identify deadlocks, blocked operations, and high CPU consumers.

OS-Level Tools
Use ps -eLf, top -H, or jstack commands to correlate Sterling B2B Integrator threads with system-level performance metrics.

Interpreting Thread States
Differentiate between RUNNABLE, WAITING, BLOCKED, and TIMED_WAITING to assess resource contention or deadlock scenarios.

Thread Tuning Parameters and Best Practices

Optimizing Thread Utilization for High Performance

JVM Thread Stack Size
Adjust -Xss values to balance recursion depth and memory usage. Larger stacks allow deeper execution, smaller stacks enable higher concurrency.

Global and Queue-Specific Thread Limits
Use maxGlobalThreads and per-queue Min/Max settings to ensure fair thread distribution and prevent starvation.

Garbage Collection Impact
Enable detailed GC logging and choose G1GC or CMS collectors to minimize thread pauses during memory cleanup.

Tuning Workflow
Monitor → Adjust → Test → Validate → Persist configuration. Always base changes on baseline performance data.

Appendix: Command Reference

Essential CLI Tools for Diagnostics and Performance Analysis

- **Log Analysis Commands:** tail -f noapp.log, grep ERROR system.log, and sed -n '/Start/,/End/p' for event isolation and live monitoring.
- **Thread and Process Monitoring:** Use ps -eLf | grep java, top -H, and jstack <pid> to inspect thread usage and JVM states under load.
- **Performance and Resource Tools:** vmstat, iostat, and free -m provide CPU, I/O, and memory metrics for identifying potential bottlenecks.
- **Queue and Service Management:** queueWatcher.sh and listProcesses.sh scripts retrieve live queue and process data for verification and debugging.

References and Resources

Supporting Documentation and Further Learning

IBM Knowledge Center
Comprehensive Sterling B2B Integrator documentation covering installation, configuration, troubleshooting, and performance tuning.

IBM Support Portal
Access product updates, fix packs, and technical support cases to stay current with Sterling B2B Integrator releases.

IBM Community & Tech Exchange
Collaborate with practitioners, share scripts, and learn optimization tips through IBM’s user community forums.

Learning and Certification Pathways
Enroll in advanced IBM Sterling courses on system automation, partner integration, and performance optimization.