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FILE TRANSFER SCHEDULING ON NETWORK ELEMENTS USING SWIM FRAMEWORK

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ABSTRACT

File Transfer Scheduling (FTS) is an application in a network management system which is used to launch multiple File transfer session between a network management system and a managed Network Element (NE). The FTS application supervises parallel NE software download or NE Management Information Base (MIB) backup sessions for multiple supported NEs. FTS operations are based on "JOB", which can be defined as a descriptor file which contains list of NEs and all the parameters required for action to be scheduled. This paper proposes a system which could be used for file transfer operations using SWIM framework.

KEYWORD: MIB, Network Element (NE), Software Download, Backup, Restore.

INTRODUCTION

A network management system is a set of hardware and software tools that allow a network administrator to supervise the individual components of a network consisting of many nodes and network elements such as routers, switch; within a larger network management framework. Network management system components assist with Network device discovery, identifying what devices are present on a network. Network device monitoring, monitoring at the device level to determine the health of network components and the extent to which their performance matches capacity plans and intra-enterprise service-level agreements (SLAs). Network performance analysis, tracking performance indicators such as bandwidth utilization, packet loss, latency, availability and uptime of routers, switches and other Simple Network Management Protocol (SNMP) enabled devices. Network notifications, configurable alerts that will respond to specific network scenarios by paging, emailing, calling or texting a network administrator.

The Optical Management System (OMS) centralizes multiple functions in one unified system for the Optics portfolio. It allows network planning and operations staff to plan, deploy and manage the network over the total life cycle. The unified system supports multiple technologies, services and network sizes in one integrated platform. It supports element, network and service management. It provides a common management platform for end-to-end operations. This includes service provisioning over multi-technology optical transport networks (SDH/SONET, Carrier Ethernet, WDM, ROADM, OTN and packet) and OSS/BSS integration. Its component based architecture easily scales to meet network growth and development from access to core.

FILE TRANSFER SCHEDULING

File Transfer operations are based on the "Job". A Job is defined by a Job Descriptor File, that contains the list of the target NEs and all the parameters related to the action to be scheduled. There are mainly three actions performed using FTS MIB Backup, MIB Restore and Software Download.

Management information base (MIB) is a hierarchical virtual database of network objects describing a device being monitored by a NMS. An MIB is used by Simple Network Management Protocol (SNMP) and remote monitoring 1 (RMON1). The MIB database of objects is intended to reference a complete collection of management information

on an entity, such as a computer network; however, it is often used to refer to a subset of the database and is often called an MIB module. Fig.1 shows an example MIB tree structure with MIB file name and its Object ID.

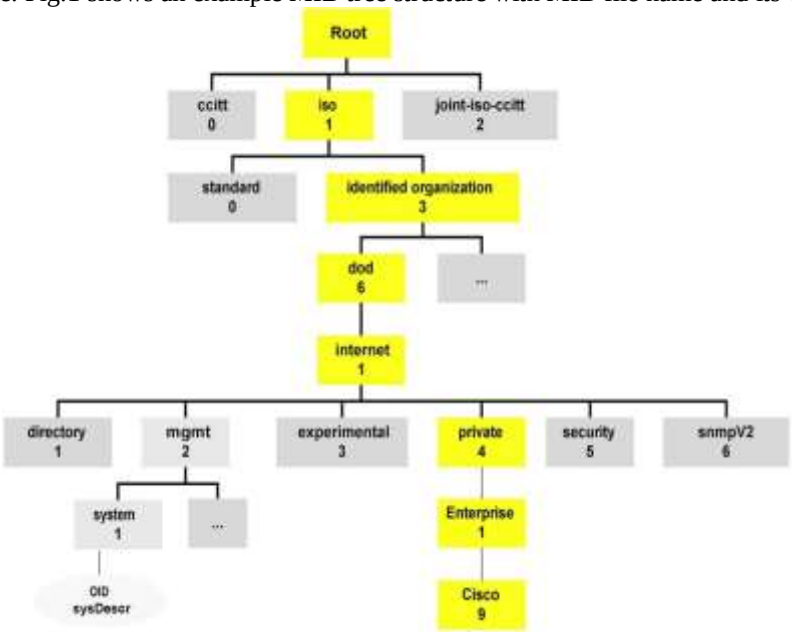

Fig1: MIB Tree

MIB Backup and Software Download jobs can be scheduled deferred depending on the NE traffic (i.e. A day can be chosen when load on NE is less). MIB Restore job has to be done immediately, which will restore MIB data on the NE. This process eliminates the need for the admin to create MIB backup for each NE individually, also restore MIB and Software packages for different NEs. All of these operations and many more of such are done from centrally managed OMS.

SWIM FRAMEWORK AND ARCHITECTURE

Upgrading software for a network device varies widely from different devices. Also, its method depend not only type of software on device, but also underlying hardware. Network devices like switches, routers have different command sequences for their upgrade procedure. Wide variations in upgrade procedures may exist even within the same family of devices. Therefore, Network administrators need a solution that hides such device-specific details and allows them to focus on the overall task of upgrading software on their network devices in a reliable and vigorous manner, consistent with prevailing practices and policies in their environment.

The SWIM architecture solves the entire software management requirement to satisfy all the network administrator needs. The backend of this application is developed based on common gateway interface (CGI) using Spring MVC framework. As the number and type of network devices rapidly scale over time, the cost of maintenance associated with cgi scripting to support an ever increasing number of new devices became a problematic issue. This is solved using the architecture and implementation of a new version of SWIM which is based on a servlet infrastructure and uses Spring MVC technology extensively to separate the content from the layout of its front-end HTML screens. In addition, it makes use of an XML-based device model for inter-model communication.

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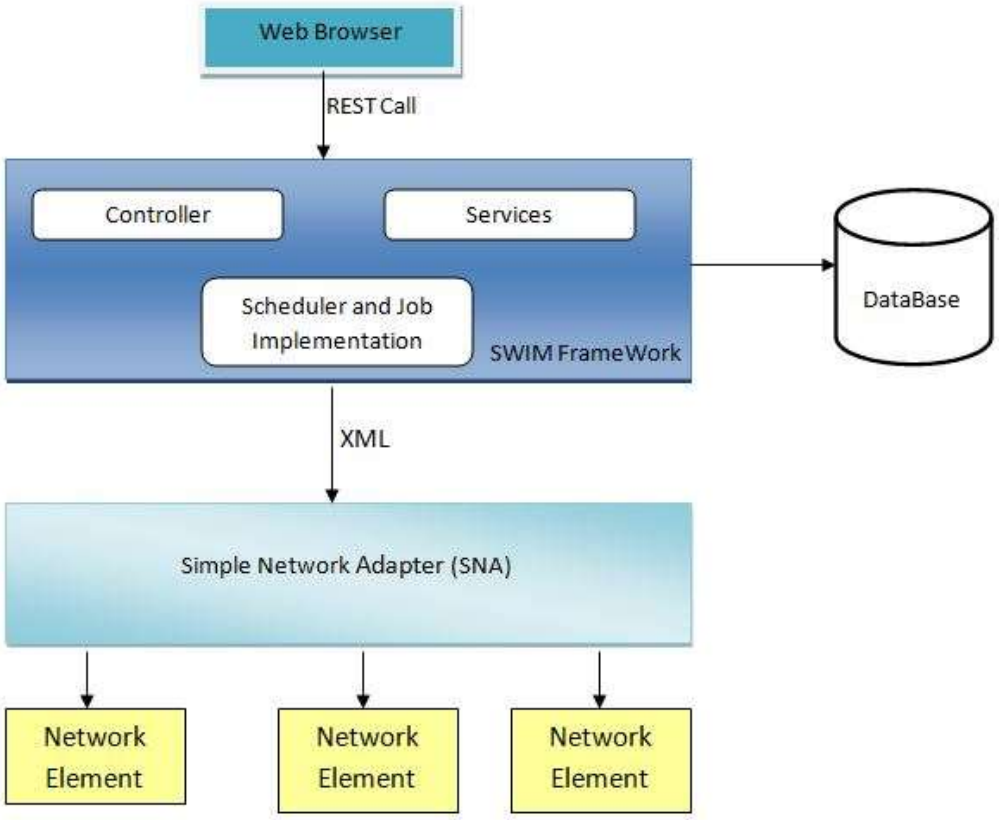

Fig 2 : FTS SWIM Architecture

The SWIM Architecture shown in Fig 2 consists of a Controller which handles all the REST Calls from the client, it dispatches the requests to the particular service handler; a Scheduler known as Quartz scheduler which is a scheduling framework written in java; a Database to store information regarding a job and its details involved such as its scheduling details, its NEs involved etc; a Job implementation which generates a XML for every particular job with its details involved. At the scheduled job time the scheduler invokes job implementation and the XML is passed on to the SNA which takes the information from the XML file and performs the required action (i.e. MIB Backup, MIB Restore, Software Download) on the respective NE.

FTS METHODOLOGY

The user creates a job with a job name, selects the task to be performed (MIB Backup, MIB Restore, Software Download), selects the NE and gives the scheduling information (i.e. if the job is immediate or a deferred job) and activates the job. This request is passed on to the server through REST call, controller at the server handles the request and invokes this the desired service, an entry in the DB is made with all the details about the job and the job is scheduled. On performing all these operations the user is notified with a Job successfully created message.

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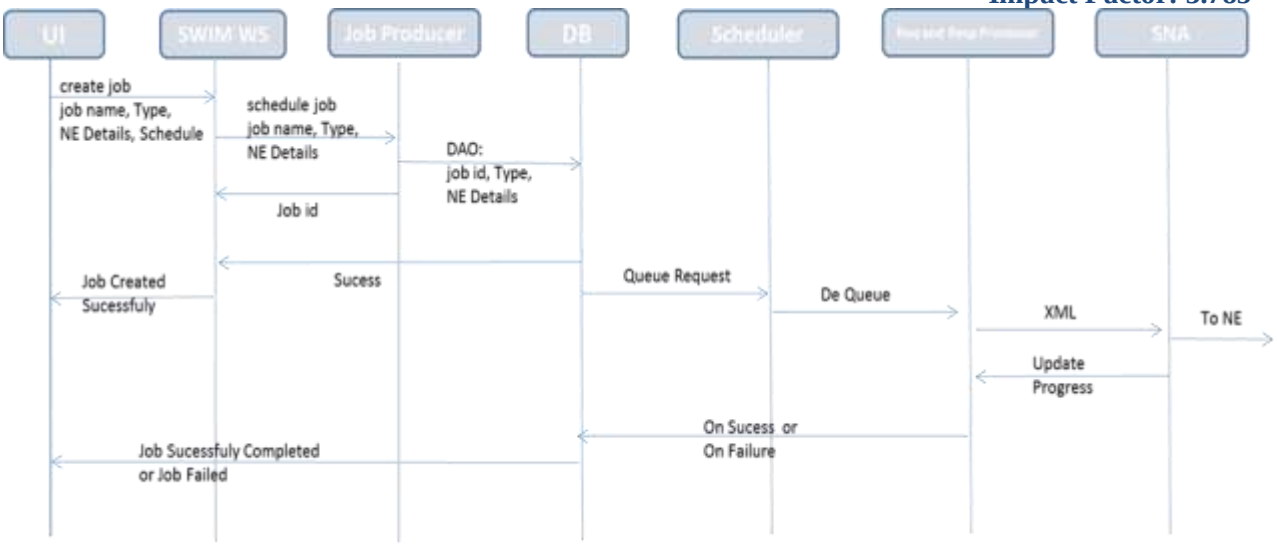

Fig 3: FTS Flow Diagram

The scheduler executes the job the scheduled time and performs the operation on the NE. The user is notified about the progress of the job and its states. The job states is shown in Fig 4, the user can abort an ongoing job also he can delete job as and when is required. After the job is done in case of MIB backup, the backup file is stored on the server and is presented to user as a repository, the same backup could be restored to that NE later. If the job fails due the some reason the user is notified a Failed message with the specific reason. If the job was successful the user is notified with the success message.

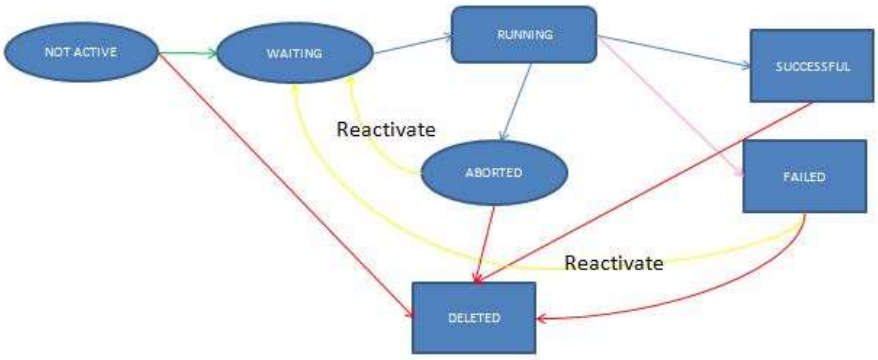

Fig. 4: FTS Job States

CONCLUSION

In this paper a system File Transfer Scheduling was proposed which is used to manage any network with any Network device. The SWIM architecture can be used to manage any growing network with exponential scaling devices. This system eliminates the need for a network administrator to individually manage a network device by taking individual backups and performing software upgrades. The network administrator by using this system could backup and restore many devices by creating a single job and also schedule the job. The future work of this system is to add remove abort from the job state and add a paused state so that the user could resume from where the job was paused.

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