

# Enterprise Remote Command Execution & Monitoring

WHITE PAPER

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## Introduction

An Enterprise Remote Command Execution and Monitoring (ERC E&M) system is a mechanism to execute commands remotely from a central system to its host systems, in order to update system software, firmware, or to restart applications.

ERC E&M uses a SSHEXEC to execute commands at the host system, and the central system monitors the execution progress. A Service Engineer is not required on the premises to upgrade the system, as he/she can do this remotely. Thus, remote commands are a powerful mechanism for smart pro-active monitoring.

In an ERC E&M system:

- The central system takes input from admin for task execution
- The central system executes the command on a remote system for a specified task
- The task will be executed on the host system
- The task progress will be monitored at the central system

## ERC E&M Architecture Overview

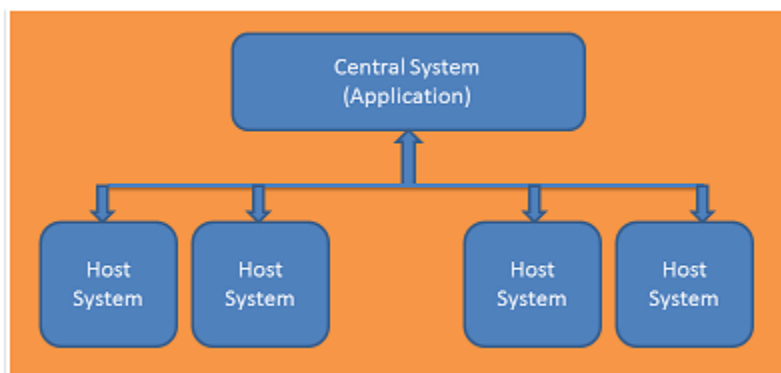


Figure 1 : ERC E&M Architecture

ERC E&M architecture involves various components that participate in the collection of information, processing of commands, and monitoring of responses. The major components in ERC E&M architecture include the:

- **Central System:** This system hosts the web application, which can be accessed from any system within the enterprise network.
- **Application:** A web-based application collects the information and issues the command for execution at the host system. The application monitors the execution process.
- **Host System:** The commands are executed at the host system.

## How it works

The basic steps to remotely execute a command are:

- Key-in the connection credentials
- Key-in the command to be executed
- Remote command execution begins
- Task execution begins at the host system
- Monitoring of the execution process begins

## Popular Uses of ERC E&M

### 1. FOR Firmware Upgradation

A firmware is a software program or a set of instructions programmed on a hardware device. It provides the necessary instructions for how the device needs to communicate. Using ERC E&M, firmware can be upgraded and the progress can be monitored.

A firmware update can:

1. Update the performance of the system
2. Fix the bugs

### 2. For Patch Upgrade

A patch upgrade is a piece of software or application to update the system software or upgrade the existing application. This includes fixing bugs, security issues, or performance improvements.

### 3. To Automatically Start/Stop/Restart Application

ERC E&M can start/stop/restart the application available at the remote system.

## ERC E&M Architecture

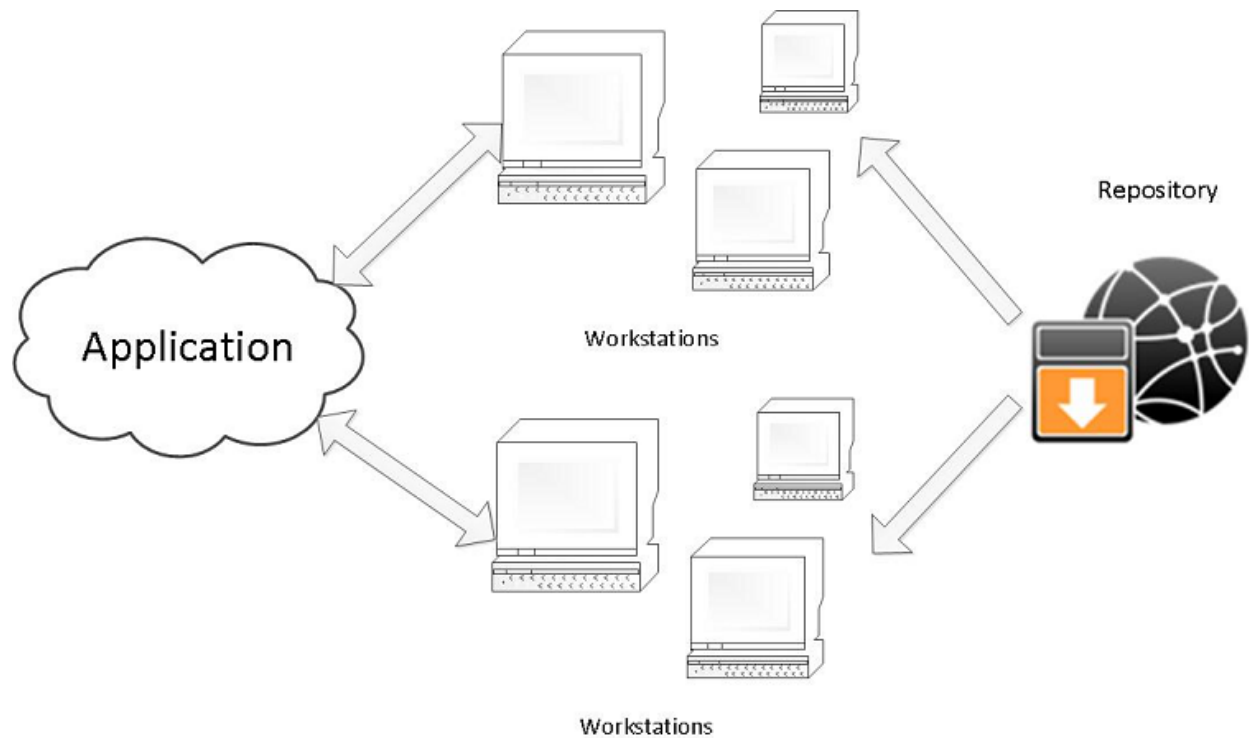


Figure 2 : ERC E&M Architecture

ERC E&M architecture mainly consists of three major components.

1. Application
2. Workstations
3. Repository

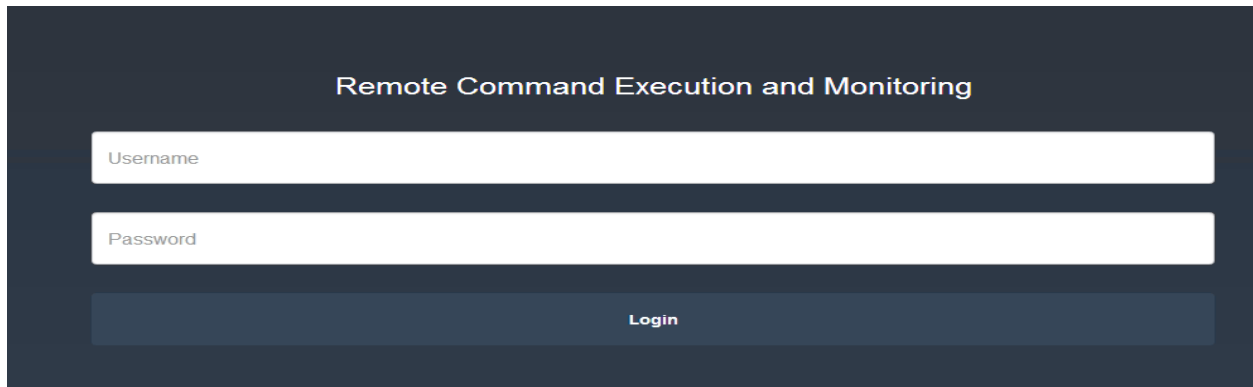
### Application Flow

An administrator login is provided to the application that is deployed at the central server. The administrator will be able to execute the commands at a single host system or multiple host systems and will be provided with two options:

1. Command execution for a single workstation  
The administrator will have the option to key-in the credentials and select the command to execute on a single workstation.
2. Command execution for multiple workstations  
The administrator will have the option to select multiple workstations and execute the same command for all the selected workstations.

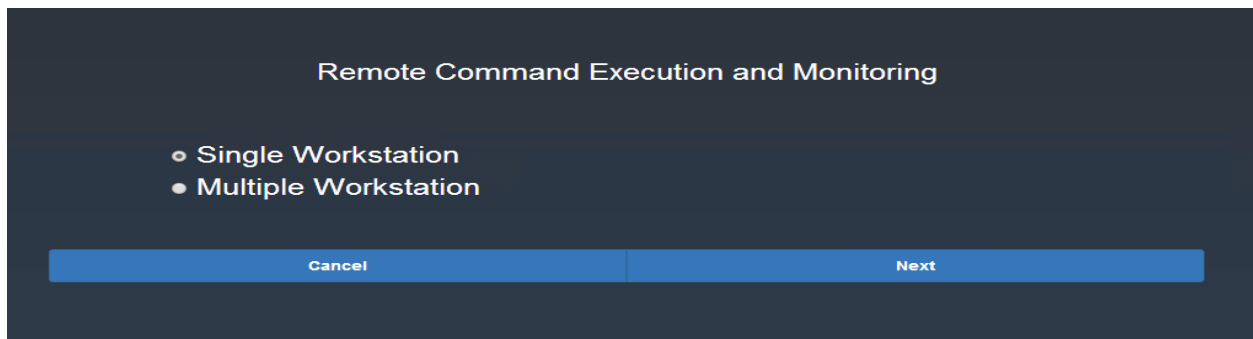
## Application Screenshots

Login:



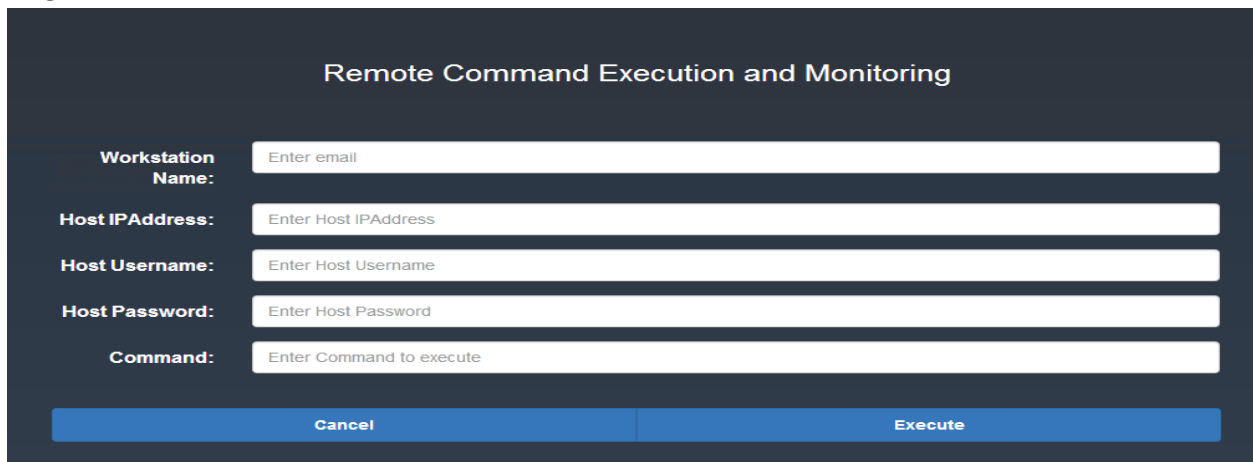
The screenshot shows a dark-themed login window titled "Remote Command Execution and Monitoring". It contains two white input fields: "Username" and "Password". Below these fields is a dark blue button labeled "Login".

Select Workstation:



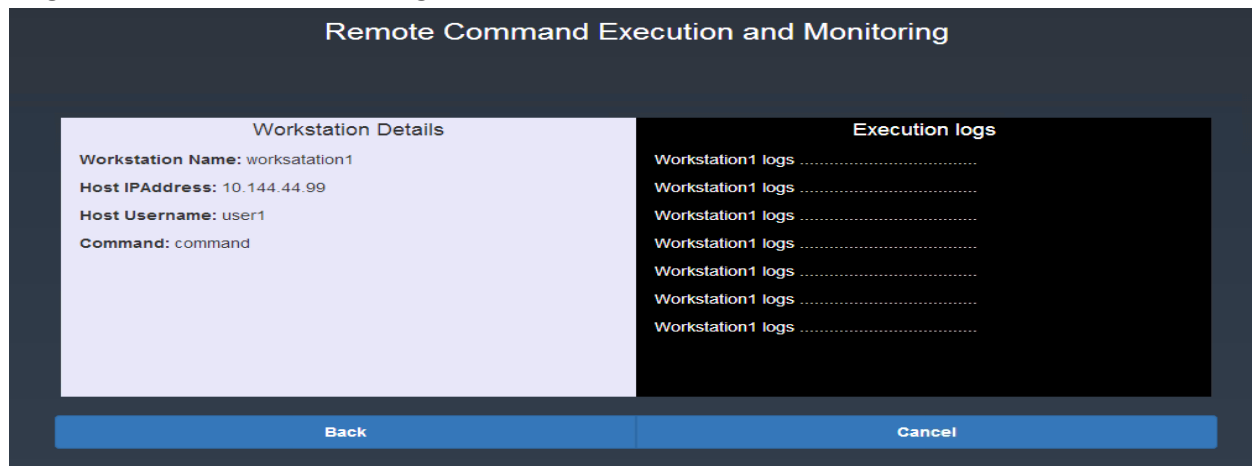
The screenshot shows a dark-themed window titled "Remote Command Execution and Monitoring". It contains two radio button options: "Single Workstation" and "Multiple Workstation". At the bottom, there are two blue buttons: "Cancel" and "Next".

Single Workstation Execution:



The screenshot shows a dark-themed window titled "Remote Command Execution and Monitoring". It contains five labeled input fields: "Workstation Name:" (placeholder: "Enter email"), "Host IPAddress:" (placeholder: "Enter Host IPAddress"), "Host Username:" (placeholder: "Enter Host Username"), "Host Password:" (placeholder: "Enter Host Password"), and "Command:" (placeholder: "Enter Command to execute"). At the bottom, there are two blue buttons: "Cancel" and "Execute".

## Single Workstation Execution Progress:



## Benefits of ERC E&M

### 1. Device Maintenance

- Firmware updates
- Application patch upgrades
- Bug fixes (if any) in the device, due to patch upgrades or firmware updates

### 2. Monetize Progress Remotely

- Remotely monitor the execution progress from a central system
- Handle and execute the appropriate command in a case of any failure

## Code Snippet

### 1. Script file:

```
<sshexec host="hostname/ipaddress"
        username="{username}"
        password="{password}"
        trust="true"
        command="command to execute"/>
```

### 2. Java code to run the command:

```
Runtime runtime = Runtime.getRuntime();
Process process = runtime.exec(command to execute script file);
```

### 3. Capture the console output and error:

#### Read Input and Error Stream:

```
InputStream inputStream = process.getInputStream() &
InputStream errorStream = process.getErrorStream()
```

#### **Get BufferRead for input and Error Steam:**

```
BufferedReader brInput = new BufferedReader(new InputStreamReader(inputStream)); &  
BufferedReader brError = new BufferedReader(new InputStreamReader(errorStream));
```

## **Conclusion**

The ERC E&M system is a powerful mechanism for command execution and central monitoring. It reduces manual intervention and the need for service engineers to visit the workstation. This paper explains the possible ways of executing and monitoring command execution.

## **Reference**

<https://ant.apache.org/manual/Tasks/sshexec.html>

## **A Note of Thanks**

*Special thanks to Sridhar Chebrolu (sridhar\_veda@hcl.com) and Balamuralikrishnan Vengateson (balamurali.v@hcl.com) for their support and guidance in developing this paper.*

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