CSC486C – Senior Capstone Design in Computer Science

Project Description

Project Title: Cloud-based Device Proxy for On-Premises Hotel Technology	
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Project Overview:

On a global scale, the business of owning and operating hotels is a $550 billion-dollar industry on an annual basis. There are more than 700,000 hotels and resorts around the globe that in aggregate represent 15.5 million rooms that are available each night.

Unlike the roadside mom-and-pop operations of the past, operating a large, modern hotel involves a wide variety of sophisticated electronic systems to provide the security, conveniences, and luxuries today's traveler demands, including*:

- Electronic Key Systems
- Movie & Digital Entertainment Systems
- Sales & Catering Systems
- Energy Management Systems
- Point-of-Sale (POS) Systems
- Telephony/PBX/Voice Mail Systems
- Accounting Systems

**See https://www.skytouchtechnology.com/skytouch-hotel-os/partner-interfaces.php for a complete list of currently supported interfaces*

The systems installed to support these functions are typically all from varying vendors, meaning that each has its own interfaces and communication protocols. The fundamental problem driving our business unit within Choice Hotels is that, in order to function seamlessly and efficiently, information streams from all of these disparate subsystems must be gathered and integrated into a coherent hotel management system. The SkyTouch Hotel OS® is our premier product for managing this systems integration function. Backed by the strength of Choice Hotels International, the SkyTouch platform is a cloud-based,

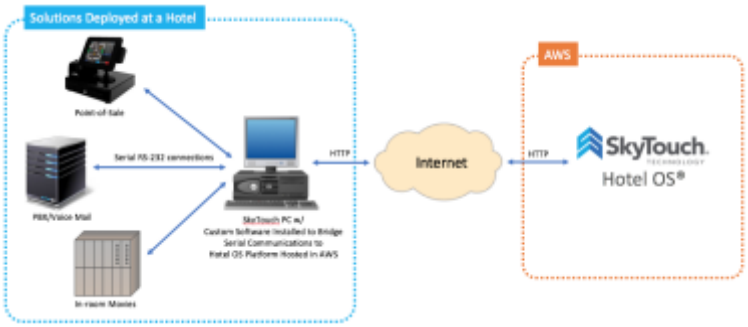

Figure 1: Currently deployed architecture

Software as a Service (SaaS) solution that powers more than 7,000 hotels around the world.

The project proposed here is aimed at improving the capability of SkyTouch Hotel OS® to access and manage the many varied hardware subsystems installed in today's modern hotels. While some of these subsystems support modern TCP/IP-based communication, there are still many that rely on legacy RS-232 serial port connections to send and receive information. To address this challenge,current solutions require custom software to be physically hosted at a hotel to handle legacy communication (see Figure 1). Developing custom software tailored to each hotel is costly to create, and even more costly to maintain over time.

For this project, team members will create a solution to proxy serial and TCP/IP based protocols to the cloud (AWS) eliminating the need for a custom application to be deployed within each hotel (see Figure 2). It is envisioned that this solution would leverage an off-the-shelf terminal server to pass the device-specific serial protocols over raw TCP/IP sockets to an application hosted within AWS ("Device Proxy");
although the project team is free to explore any and all alternatives to this approach. The proxy application would replace the custom software that is currently deployed on-premises at each hotel and would need to support communication with thousands of devices housed at thousands of hotels.

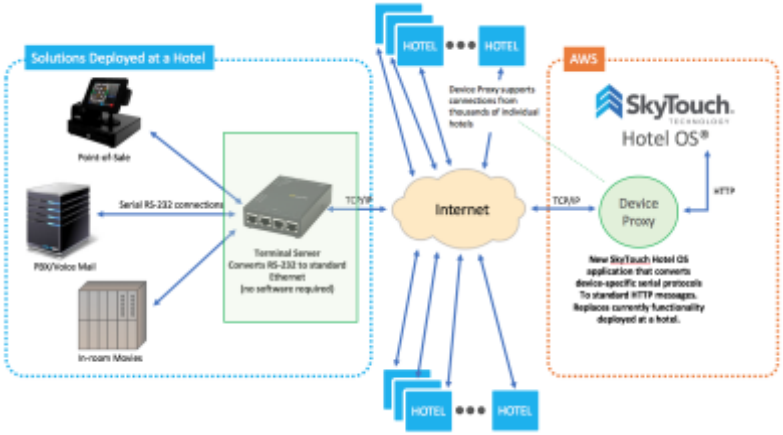

Figure 2: Envisioned system architecture

Key functional features of the final project will include:

- Will support multiple, physical serial connections on-premises that are then bridged to TCP/IP over standard Ethernet
- Will include a new Java application, deployed in AWS, to proxy 2-way communication between on-premises systems and other applications deployed in AWS
- Proxy to support multiple third-party device protocols in an extensible manner, e.g., allowing "plug-ins" to be easily added to support new RS-232 devices.
- Proxy to support independent configurations for thousands of hotels given that each hotel managed by SkyTouch has its own unique collection of on-property systems that will need to communicate with the SkyTouch Hotel OS® platform
- Support strong security including industry standard encryption user authorization & access
- Will require minimal hardware deployed on-premises

Knowledge, skills and expertise required for this project:

- Basic understanding serial and TCP/IP communication and protocols

- Familiarity with Amazon Web Services (AWS) and Cloud deployment
- Java programming expertise

Equipment Requirements:

- Nothing beyond a normal development machine, and freely available software
- Client will provide AWS resources and any specialized hardware needed to demonstrate the solution

Deliverables:

- A strong as-built report detailing the design and implementation of the product in a complete, clear and professional manner. Includes solution architecture diagrams and high-level documentation. This document must provide a strong basis for future development of the product.
- Complete, professionally-documented codebase, delivered both as a repository in BitBucket (SkyTouch to provide access) and as a physical archive on a USB drive.
- API documentation for supported protocols
- Complete documentation describing installation, configuration, deployment, & administration of the solution
- Demo of the solution to the Skytouch Team.