



**HOSPITALITY 4.0:**  
Bridging the Gap Between  
Guest, Operations, and  
Technology Silos

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White Paper

# The Hospitality Evolution

Almost no other industry faces as many needs as the hospitality industry, but technology can help. It is no longer necessary to hire separate staff to cater to the different needs of your guests; you simply need the right software and programs.

That said, the hospitality industry has been a late adopter of the technology trends that other industries and markets have adopted. Most hotel and restaurant owners seem cautious when investing in new technologies, even though many technologies can optimize various aspects of the hospitality industry and make the challenges of the current landscape more manageable.

Technology advances the hotel industry by allowing hoteliers to run more efficiently and giving guests opportunities to personalize their experiences. While exciting technologies present new options for hoteliers to enhance their offerings, these innovations also mean hoteliers must focus on data security and system availability while implementing these technologies.

Because of the lack of standardization in hotel technology vendors, technology and data fragmentation is getting worse at properties and hotels.

The need to implement cutting-edge technologies is transforming hospitality into a 100% digital technology-enabled industry - powered by online, mobile, cloud, IoT, edge computing, augmented and virtual reality (AR/VR), and low code applications.

Hotel Management	Distribution	Revenue Management	CRM and Loyalty	Marketing	Reputation Management
<ul style="list-style-type: none"> <li>Property Management System (PMS)</li> <li>Human Resources</li> <li>Housekeeping</li> <li>Operations</li> <li>Back Office</li> <li>Concierge</li> <li>Guest Services</li> </ul>	<ul style="list-style-type: none"> <li>Global Distribution System (GDS)</li> <li>Central Reservation System (CRS)</li> <li>OTAs (online travel agent connections)</li> <li>Booking engine</li> <li>Channel</li> <li>Manager technology</li> <li>APIs</li> </ul>	<ul style="list-style-type: none"> <li>Revenue management System (RMS)</li> <li>Augmented Reality</li> <li>Rate shopping</li> <li>Tech</li> <li>Business Intelligence (analytics)</li> </ul>	<ul style="list-style-type: none"> <li>Data Management Platform (DMP)</li> <li>Communication Manager</li> <li>Marketing Automation</li> <li>Loyalty technology</li> </ul>	<ul style="list-style-type: none"> <li>Website technology</li> <li>CMS</li> <li>DSP</li> <li>Social Media</li> <li>Tech</li> <li>Web Analytics</li> <li>SEO Technology</li> <li>Programmatic Data Marketing</li> </ul>	<ul style="list-style-type: none"> <li>Online Reputation Management (ORM) Systems</li> <li>Survey technology</li> <li>Business intelligence</li> <li>Guest Services</li> </ul>

Hospitality technologies and applications

All these solutions improve guest experience and satisfaction, operational efficiencies and productivity, customer service, and revenue. Many, however, are not prepared today.



## Challenges

Hotel and restaurant chains experience regular challenges regarding staffing, reception wait lines, guestroom planning, ordering, stock management, complexity, costs, IT security, technology integration, and unplanned downtime that influence a single location. Additionally, the hospitality sector faces potential issues with schedule and time management, communication, network security, data handling, remote site management, and PCI compliance.

**Security.** The increased need for cybersecurity is among the most vital technology trends in the hospitality industry. The pressure to modernize and keep up with guest expectations makes hospitality a dynamic industry and a vulnerable target for network cyberattacks. In fact, hospitality ranks **third**, behind retail and finance, for the likelihood of a data breach. Three out of four businesses are not prepared, and potential disasters are waiting to happen. Most hotels are handicapped by the lack of knowledge and expertise they carry on the subject.

Hotel technology infrastructure must ensure that all digital interactions with guests adhere to robust security tech and privacy rules. Hotel networks and databases should be equipped with all necessary solutions to secure guest devices, in-room technology, and all IoT devices accessing the hotel network. With multiple point-of-sale touchpoints, an even larger number of smart devices and data generated, demands a secure hotel network. Denying cybercriminals access to the network and preventing them from spying on guest devices is now essential in hospitality.

**MGM Resorts** revealed it was the target of a massive data breach that compromised the personal information of more than 10.6 million guests. Spanish headquartered Meliá, the 17th largest hotel chain in the world, was crippled for days due to a **cyberattack** in October 2021. **Nordic Choice Hotels**, a chain with more than 200 hotels across Scandinavia and the Baltic countries, was still dealing with technology problems and the fallout from a data leak in mid-January after a December ransomware attack. Last but not least, the cyberattack on the **Harbour Plaza Hotel** in Hong Kong exposed the personal data of more than 1.2 million guests. A luxurious Austrian hotel's computer-controlled key-card system locked 180 guests out of their rooms until hotel managers paid a nominal ransom. Nonetheless, the incident caused a major disruption to the hotel and its high-paying guests.

Many hotel chains rely on a centralized or outside service to handle IT problems, so individual properties may be ill-equipped to identify and respond to a ransomware incident quickly. Often, this problem is accelerated by the lack of onsite infrastructure knowledge.

Bad actors can break into payment systems through a remote access point belonging to one of its vendors, so they should closely monitor third-party access to their networks. Their IT security teams should also always be in control of vendor access to enforce access control policies and watch all third-party activity. Separating “the thing” from the software running it will help to provide more and better control on any third-party access when virtualizing such an application. Given the extreme explosion of IoT devices, this must be considered. We will go into further detail in the IoT explosion challenge section.

Minimizing security risk is (or at least should be) the most important challenge for all hospitality business executives. Running an on-premises infrastructure to support all essential hotel functions will help to minimize the risk of a security breach. Instead of relying on a cloud-based or central system, affecting all locations during a cyberattack, local highly available edge computing solutions minimize security breach impact. Typical recovery from a cyberattack happens in a fraction of the time compared to an attack on a (private) central cloud-based system or traditional local IT infrastructures.

**Integration.** The hospitality industry has many software applications, and the key challenge is first to integrate all the software efficiently, and secondly, to ensure the integrated software communicates with each other, ideally in real-time. Unfortunately, there is still a high cost to achieve this integration, and that is a barrier for many hoteliers.

With new technologies emerging daily and increasing usage of these tools among guests, implementing these technologies in your hotel, restaurant, or casino becomes inevitable. The need to sync and integrate these hospitality tools adds yet another layer of complexity. To solve complexity, hotels need to consider investing in next-generation systems to streamline their operations and ensure smooth management of their infrastructure.

The inoperability of hotel technologies can impose unwanted restrictions on the service delivery process. Loss of revenue is just one of many repercussions hotels can face due to unorganized technology infrastructures. Inoperability also affects the guest experience, creating conflicts and causing inconvenience that contradicts the service delivery promise, especially in branded franchise hotels.

Big players are holding back on innovation, either through the scale of their systems and the associated inflexibility or their unwillingness to work with smaller suppliers to create an integrated system. Smaller organizations can be more agile, and that flexibility is a priority in the fast-moving technology era.

The use of APIs in the hospitality industry is still uncommon but can help to overcome integration challenges. APIs add efficiency to hotel technology by integrating the technology stack, assisting tools to talk to one another, for example, connecting your RMS to a PMS, or your business intelligence software to your PMS. An API makes your technology user-friendly and efficient, automating tasks. When your tools work together, you capture each platform’s full capabilities. Feeding data from your PMS into a business intelligence tool leads to real, operational data to analyze trends and provide recommendations for better marketing campaigns, smarter staffing decisions, seasonal trends, and market competition. Hotels comfortable using APIs can automate tasks that take up much of their employees’ time with manual data entry.

APIs are not just important in the application layer. From an infrastructure point of view, there are many areas where, if an API were available, you could gain a lot of efficiencies. Larger hotel and restaurant chains can benefit from this technology and better handle their deployments across many sites.



Video surveillance is another area waiting for integration. Video surveillance camera use has become an important tool in overall premise security programs used by hotels to protect life, property, and assets. While not effective as standalone security features, security cameras can and have been used effectively as part of an integrated security program to reduce the potential for crime, enhance physical controls, assist in investigations, and enhance public/life safety. Surveillance cameras should be deployed as part of an overall security program with consistent monitoring and the ability to provide prompt emergency response.

VMS (Video Management System) use is most common to track activities at reception, check-out areas and parking. More and more, however, VMS systems can help the hospitality industry staff track occupancy, prevent overcrowding, and ensure social distancing compliance.

To guarantee uptime, VMS applications typically run on one or more dedicated servers. These environments are complex to manage. Running VMS applications as a virtual machine on the SC//Platform IT infrastructure will eliminate this complexity and provide uptime, even without an internet connection. Together with your other applications, it is just another VM. It also means that by securing the cluster automatically, every VM, like your VMS virtual machine, is secured.

In some hospitality environments, such as a casino, the number of cameras is beyond imagination. State-of-the-art mega hotel and casino Resorts World in Las Vegas which opened its doors in 2021, runs a stunning 13-petabyte storage infrastructure to support 14,000 high-definition cameras on the SC//Platform hyperconverged infrastructure. Resorts World sees many **benefits**, spending less time managing their **Milestone** VMS environment.

**Unplanned downtime.** The hospitality industry needs real-time IT support to help reduce the cost of downtime. You want accuracy and reliability for your employees and customers during a network outage, but it's tough to have someone available 24/7/365 on every site.

When your network goes down, you want to reduce the amount of data lost. Setting up a schedule with frequent backups or replications can keep your data safe, so you're ready for an emergency. The cloud does not provide the guarantees most organizations seek to ensure operations keep running 24/7/365. The top unplanned downtime causes are IT equipment failure and network outage, human error, problems at a service provider and cyberattacks.

Customer experience can have a tremendous impact on your business. Bad Wi-Fi connection, downtime at parking facilities, and long waiting lines at check-in all impact the customer experience. Consider your guest checking into your hotel after a tiresome trip, and taking at least ten to 15 minutes to complete the check-in process due to the failure of IT systems. Imagine how your guest would feel. They would have a negative first impression of your hotel. Guests completing the check-in process within a few minutes feel much better!

NEC helps to address **downtime challenges** with their unified communication system. Their website states, “You don’t want to be the one hotel out there that doesn’t provide the expected service. Your customers will go to your competitors who are willing to offer what has become the standard. It isn’t enough that your hotel is equipped with top-of-the-line technologies and services if you can’t deliver them to your guests—which means you’ll have to keep your IT systems functioning 24 hours a day, seven days a week to maintain happy guests.” Running NEC’s unified communication solution on SC//Platform provides the high availability you need.

When IT systems experience downtime, there can be short-term and long-term damage to the business. Direct loss of revenue is the number one impact, followed by loss of productivity, data loss, and loss of customer trust and company reputation.

**The cloud.** Although many might not see the cloud as a challenge, it certainly is. The latest **IDC report** is clear and is one more reason to think twice about the cloud. Too often, organizations implement an all-cloud or cloud-first strategy. But, according to IDC, for reasons outlined below, organizations are abandoning the cloud:

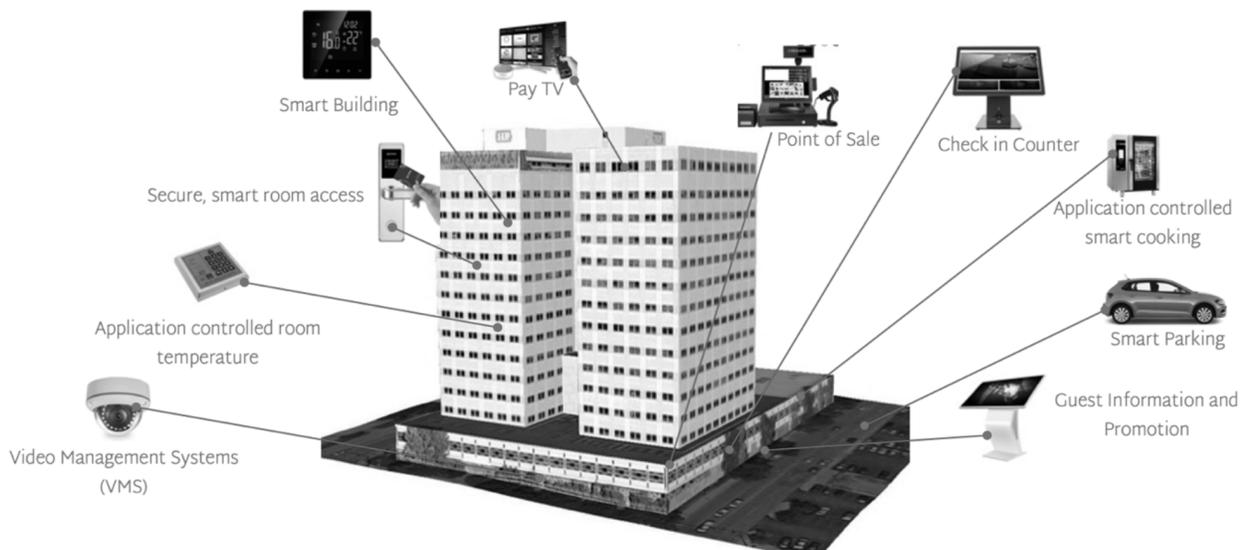
- **Cost.** The initial run to the cloud was affordable because cloud providers made it attractive to move. Now, organizations are dealing with significantly higher costs due to data transfer.
- **Internet outages.** Counting on cloud availability is a high risk. Even if you have done everything during the design phase there are no uptime guarantees. There are many reasons why. With global warming becoming a real issue, weather conditions are changing. Flooding occurs more frequently and can disturb internet connection availability. As in the summer of 2021, extreme weather conditions resulted in a disaster in Belgium and Germany.

If there is a construction accident near your site and a cable is cut by accident, can your internet service provider guarantee it will not face any outages or backbone congestion? Don’t bet that internet connections will always be available to rely on the cloud.

- **Ease of use.** The cloud isn’t “easy.” Managing larger cloud deployments requires a different skill set versus data center deployments. Training the workforce and continuous architecture changes add to the mounting costs.
- **Security.** According to IDC, **98% of companies experienced a cloud breach** in the last 18 months. The risk is much higher versus an on-premises edge device you can simply unplug. Organizations implementing on-premises infrastructure can recover faster from a cybercrime attack like ransomware. And transporting data also increases risk.
- **Innovation restrictions.** Innovation requires speed. Low latency is not an option for many applications. AI, AR and smart IoT make inroads, demanding local compute power at the edge.

**IOT explosion.** The Internet of Things (IoT) is a big change in hotel technology. It is already revolutionizing the markets with devices like self-serving kiosks, smart lighting, and temperature control on pre-defined instructions. At the same time, the explosion of IoT devices also creates a tremendous challenge for the hotelier or restaurant owner.

Many areas make a hotel or restaurant vulnerable to cyberattacks, mainly due to the increasing number of Operational Technology (OT) systems and IoT devices.



**The explosion of IOT devices in and around a hospitality site make your location highly vulnerable to a cyberattack or any other form of cybercrime**

**Centralized management.** Digital innovations like self-service kiosks, smart kitchen devices, robotic chefs, and other more common IP-enabled devices need to be related, managed, and monitored efficiently. With complete visibility into each location, the IT department must be capable of managing, monitoring, and troubleshooting any connected device remotely while preserving security policies to shield the POS environment.

**Analytics.** Data has become the world's most valuable resource. Data can fuel smarter marketing campaigns and capture a higher market share than your competitors by knowing your guests on a deeper level. Knowing your guest is more important than ever in this competitive marketplace. Imagine the guest experience when welcoming them at the check-in counter with, "welcome back! It looks like you stayed with us in January. Would you like a bottle of our house chardonnay in your room again, like the last time you stayed with us?"



**Guest room innovation.** Smart hotel rooms use technology to allow guests to personalize their stay experiences: digital interfaces to control lighting and temperature, entertainment options available for streaming on any device, and sensors that reduce power usage during specific hours or when the guest is not in the room. Various computer-based building services can automate lighting, refrigeration, air-conditioning, and heating.

Heat scanning is another innovation in the hotel room. Infrared scanners minimize disruptions relating to housekeeping. Instead of hanging a “Do Not Disturb” sign, infrared scanners that detect body heat within a room tell cleaning staff that they should come back later if a room is occupied.

Hotels are catching on, adding convenience through streaming, voice activation, guest-room tablets, and food ordering technologies. Tablets allow guests to customize their experience at will, booking spa appointments, taking advantage of food and beverage offers, and exploring local tours. Tablets provide a new channel for generating additional revenue and improving the overall guest experience.

**Augmented and Virtual Reality (AR/VR).** The hospitality industry gradually leverages AR and VR technologies to enhance customer journeys. The end-to-end services in the hospitality industry do not start when customers travel to the property. They begin earlier. The emergence of AR and VR helps customers plan their trips. For instance, comprehensive personalization during hotel reservation suggests how guests may customize their room by AR. Most modern VR tour videos can be viewed within a web browser, making them easily accessible. The hospitality industry needs **speedier technology innovation**.

Customers expect to be able to interact with hospitality companies across a variety of digital channels and receive rapid responses. Of course, having staff monitoring all these channels and delivering swift responses can be difficult, if not impossible, which is where chatbots and AI come in.

All these new technologies need a high available infrastructure platform to run on. Some of these simply need low latency to operate, while others need to be available 24/7/365 without any downtime.

## Overcome Challenges with SC//Platform

There is an answer to many challenges the hospitality industry faces. With the IT infrastructure solutions of Scale Computing, organizations can modernize their hotel or restaurant at the lowest total cost of ownership (TCO) available in the market today.

A future-proof edge infrastructure technology strategy is based on flexibility. After all, new applications, devices, data sources, and needs emerge constantly.

Some applications may be resource and data storage-heavy. Others may only need to run a few very lightweight applications. For example, a new deployment needs to run a few small applications that collectively consume just a few gigabytes of memory. Would it make sense to deploy an infrastructure that itself consumes 10x those resources to function? Of course not. The additional cost of such an infrastructure due to excessive overhead is a significant barrier, especially if multiplied across tens, hundreds, or thousands of distributed edge sites, as costs multiply at the edge.

Instead, a solution should deliver the core functions of a data center, but is also scalable. Edge infrastructure deploys many nano-data centers of varying sizes. A proper edge platform should be able to scale both in the number of sites and resources per site.

While centralized data centers are measured in rows of full racks, edge deployments are far smaller. They may be single racks, partial racks, or even completely different form factors such as tower-type or extremely small IoT-sized systems.

It is possible to deploy a nano-data center of three nodes, collectively no larger than a shoebox, which can run a dozen or more applications while delivering 10,000 IOPS. This type of radical change in form factor impacts where systems are deployed, the power they require, the heat they generate, and the cost of the hardware itself. The new Intel [NUC Edge Enterprise Compute](#) (EEC) edition is an example of an edge cluster allowing for nano-data center deployment.

The new Intel-based cluster also helps to contribute to a better world. With over 75% CO2 reduction compared to traditional rack servers, it boosts corporate sustainability goals. No more onsite repairs, and power savings up to \$500 per year per cluster<sup>1</sup> are just a few of the many areas impacted.

Due to fewer material needs during the manufacturing process, no more on-site repairs, shipping efficiencies, and dramatic power reduction, CO2 emissions of the HE10 Series, based on the Intel NUC EEC, are reduced by more than 75%.

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<sup>1</sup>Results of internal demo center testing.



**Scale Computing Platform is designed for the edge.** “Deploy local, manage central” is what it’s all about. Together with Scale Computing Fleet Manager, it’s easy to manage five or thousands of edge sites and dramatically reduces ongoing management costs.

SC//Platform combines servers, storage, and virtualization management into a single solution, making IT infrastructure easier for organizations of every size. Whether the hospitality group has one IT administrator or dozens, SC//Platform’s hyperconverged infrastructure eliminates complexity, lowers costs, and frees up management time.

Using an appliance-based approach to virtualization, SC//Platform infrastructure allows fast deployment, easier management, and will enable organizations to scale seamlessly as the requirements at the edge grow.

Furthermore, as needs change, resources might be added without disrupting the existing workloads. Conducting a 3-hour maintenance for each edge site with no local IT staff is simply not a viable option.

**Appliance or Software Only.** For volume deployment, Scale Computing HyperCore is also available as a software-only subscription, running on certified hardware. Custom certifications are optional at a certification fee.

**Deployment Automation.** The distributed edge computing environment comes together with the management and monitoring capabilities of SC//Platform. Customize your operational view with tags and groups for meaningful insights and actionable data combined with historical reporting. Troubleshoot quickly and efficiently with centralized logging of remote site events and security auditing. Bring hundreds or thousands of sites into view with an intuitive and uncluttered user interface, a robust repository of information, continuous monitoring, and remote management at your fingertips.

- Live monitoring of all edge sites
- Detailed proactive alerting and monitoring, highlighting any deployments needing attention
- Horizontally scalable, from one to thousands of sites
- One-click access to individual deployments through the dashboard
- Centrally deploy new applications
- Drill down to individual edge clusters for additional details
- Monitoring of individual hardware devices, cluster health, application health, memory usage, and CPU utilization from the central dashboard
- Application deployment and management

**Cloud-init customization via REST-APIs.** SC//HyperCore includes cloud-init customization via REST-APIs to enable infrastructure-as-code so developers and administrators can automate otherwise very manual processes. With this, you can:

- Mass provision customized VMs
- Save time automating manual steps in site and application setup
- Manage application updates
- Reduce human error from manual setup
- Ensure deployment consistency across sites
- Enable consistent change control and more reliable updates through standardization.

**Zero-Touch Provisioning (ZTP).** Scale Computing Fleet Manager with Zero-Touch Provisioning is the fastest time to application deployment. ZTP allows administrators to centrally configure clusters in SC//Fleet Manager before nodes arriving on-premises, decreasing the installation time of nodes and clusters by 75%. ZTP minimizes the IT resources needed to install new infrastructure at the edge.



With SC//Fleet Manager's ZTP, you avoid:

- Manual on-site configuration
- Configuration inconsistencies with many devices
- Potential for human error
- Sending expensive IT resources on site
- Wasting productivity better spent on other tasks
- Needing IT tools onsite (keyboard/monitor)

## Modernizing With Low-Code And Containers

In its effort to modernize operational technologies, the hospitality industry adopts low-code and container technologies to boost its application efficiency.

Customers often ask if running containers and Kubernetes on SC//Platform is possible. The answer is yes! Many of our customers run containerized workloads on SC//Platform today. We expect the adoption to increase over the coming years as more and more application vendors take advantage of the portability provided by containers. The more complex these container-based applications become, the more likely they will be deployed with an orchestration tool such as Kubernetes.

**Containers.** A container bundles together the entire runtime environment, including the application, its dependencies, libraries/binaries, and the configuration files needed to run it. Containers are outstanding in their ability to provide consistency from one environment to another (e.g., from the developer's test environment to a VM running on SC//Platform).

**Kubernetes.** Kubernetes is a widely adopted, open-source orchestration tool for managing and running containers in production environments. It provides a framework for containers' resiliency, networking, load-balancing, and scaling. It is common to see these tools as a part of a larger CI/CD (continuous integration and continuous delivery) pipeline.

## Conclusion

Hospitality stakeholders who upgrade their existing hotel or restaurant IT infrastructure or those designing a new location, should consider Scale Computing Platform.

Scale Computing combines high available and extremely easy to manage clusters with a low TCO, from extremely small to large edge implementations. From a lifecycle perspective, SC//Platform implementations can easily adapt to continuously changing requirements.

For more information, call your local Scale Computing representative, email Scale Computing at [info@scalecomputing.com](mailto:info@scalecomputing.com) or have a look at our website: [scalecomputing.com/hospitality-edge-hci-solutions](https://scalecomputing.com/hospitality-edge-hci-solutions)

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