



# Labor observations for IT infrastructure

## IT infrastructure analysis

The IBM IT Economics team is a worldwide group of technical and financial consultants who work with clients to optimize their IT operations. The team focuses on identifying areas for efficiencies, cost reductions and increased business value for client business objectives.

Clients ask the team to find infrastructure and solution improvements to minimize overhead and maximize qualities of service. Areas of analysis include hardware and software purchase and maintenance costs, disaster recovery, security, datacenter costs such as networking, floorspace, energy, and labor.

## Labor observations

The following paper summarizes labor efforts observed by the team in client environments in which both mainframe and distributed servers run. These observations are based on ten years of IBM IT Economics studies for over 50 clients employing both mainframes and distributed servers for their business critical workloads.

While each client's IT environment was different due to service level agreements, server types and workloads, one or more of the following practices were found to drive two behaviors 1) use of more distributed servers than actually required and 2) use of more labor for distributed servers than for mainframe servers.

## Common practices in distributed server environments

- Some applications or lines of business do not allow sharing with other departments. Clients adhering to this practice indicated they require a higher aggregate number of servers than for a shared resource topology in which all users consume common resources as needed.
- Most clients confirmed development and test are rarely run on the same distributed server with production, and deploy additional physical servers dedicated to development and test use only.

- Similar to server utilization, some clients estimated that their storage for distributed systems could be underutilized due to the inability to share resources across departments, and production and non-production environments.
- Multiple clients indicated that they have up to five duplicated environments with some combination of production, development, test, high availability, quality assurance, and disaster recovery.
- Most clients stated that they host their application and database workloads on separate servers.
- In some accounts the lines of business create separate copies of data to run analytics, each hosted on its own servers.
- For tier one applications, many clients indicated they adhere to a three year server upgrade cycle to leverage the latest technology as well as to mitigate potential hardware failures.
- In some cases the client's procurement department negotiates advantageous terms with a vendor for a specific server type (same number of cores and fixed amount of memory). Yet the same client's IT department indicated that a 'one size fits all' server profile does not satisfy all core to memory ratio requirements. Depending on the workload, a server can run out of memory before exhausting CPU capacity. To mitigate resource constraints, their staff deploys one or more additional servers to support the workload.
- Some clients indicated that new server purchases can be challenging. If more than a year has elapsed since their last purchase, they may not find the same type of server with the same supported version of operating system. As these differences proliferate, more planning and deployment efforts are required.

- For some clients with larger networking environments, full-time dedicated specialists are required for capacity planning and the physical effort of router and switch management.
- A few clients with exceedingly intricate and large distributed server centers expressed challenges diagnosing and resolving outages.
- When asked about software asset management and compliance, many clients indicated this task is one of their most time-consuming tasks due to the sheer number of servers and the different workloads on them.
- Numerous clients indicated that disaster recovery testing is a large task for their distributed server environment. A few reported that as much as three to four times more labor is required to complete these tests with distributed servers than with IBM Z<sup>®</sup> due to the challenges of maintaining an exact, mirrored distributed environment in two locations. Even minor differences between the site of failure and the alternate site can impact disaster recovery. Most concurred that virtualization software has made significant strides to alleviate unforeseen deltas. For Tier I applications, however, extensive testing is still required in order to comply with business mandates of 100% disaster recovery success.
- Most clients reported that they allocate some time to prepare, train, and practice failover procedures in the event of an outage to ensure the solution works.
- Most clients indicated that their organizations have taken additional steps to increase security which has required more administration to monitor firewalls, oversee identity management, supervise access management and more.
- All clients affirm that each new physical server requires installation and testing of the physical environment (racking, cabling, inventorying) and that the following administrative processes are required for each server.
  - Server provisioning
  - Software installation
  - Maintenance
  - Application on-boarding
  - Capacity management
  - Change management
  - Access management
  - Asset management

## Common practices in mainframe environments

- These same clients affirmed they adhere to the same administration processes for their IBM Z environment but most indicated that due to its architecture and ability to run hundreds of workloads in a single physical server, the level of administrative effort was significantly lower. Clients concurred that management of one or a few servers was simpler than managing hundreds.
- All these clients concurred that IBM Z Modification Program/Extended (SMP/E) functionality to evaluate software levels and microcode levels dramatically, if not entirely, alleviated operation exposures from resulting code level incompatibilities.
- Most clients attributed IBM Z's fault tolerance, self-diagnosing, and self-healing capabilities to be significant time savers. Their administrators can reliably predict workload and server activity and avoid cycles diagnosing and resolving after an event. Without the need for manual intervention, their IT staff can focus on other administrative tasks.
- All clients affirmed they could run separate workload environments on their mainframe without the need to separate lines of business by physical server access.
- Most clients reported that an IBM Z upgrade was less labor intensive due to fewer physical servers, lower upgrade frequency, and IBM assistance to perform the upgrade.
- When asked about security these clients reported they required less effort to perform security tasks. Some clients indicated they believe they can save up to 5% in application development labor by using pervasive encryption for IBM Z since their application programmers no longer need to perform individual encryption tasks.
- Many clients indicated that IBM Z CPU sparing or capacity additions that are performed automatically and on the fly save significant amounts of time compared to distributed server capacity planning.

- Most clients reported that with IBM Z shared storage, administration is reduced to simply managing the number of connections to each device. Serialization between IBM Z servers is automated so that administrators do not need to supervise access, CPU activity or storage limits.

### Labor as a cost driver

Client practices indicate that many potentially underutilized servers require significant administration and drive IT cost. But how much is labor impacted by infrastructure?

Using server data and costs from 500 client studies, the IT Economics team analyzed the cost of labor in both distributed server and mainframe environments. Analysis found that labor costs in distributed server environments were consistently higher than in mainframe environments.

- As IT environments grew in size, for example 1,000 or more x86 servers, labor became an increasingly significant cost driver.
- In most cases the cost of labor in distributed server environments was found to be as much as two times the cost of labor in a mainframe environment.
- In most cases labor costs for distributed servers tended to increase linearly while the economies of scale for the mainframe lowered the cost of labor per workload.
- Due to administration efficiencies and IBM Z pricing structures, labor costs in most mainframe environments decreased as MIPS volumes rose.

### Labor savings

Rising labor cost was noted by some clients as an inhibitor to achieving new IT requirements. Those clients faced with flat or modestly increasing IT budgets were particularly challenged. The ability to implement new IT solutions for lines of business was dependent on budget for capital and staff. Labor analysis helped these clients evaluate workload placement options and find labor efficiencies.

Interested in knowing more about labor analysis? Contact the IBM IT Economics team at [IT.Economics@us.ibm.com](mailto:IT.Economics@us.ibm.com)

### About the authors

Craig Bender, IBM Director and John Gustavson, CTO of the worldwide IBM IT Economics Team perform on-site client consulting for IT solutions. Craig and John have worked on hundreds of complex heterogenous client environments to find technical and financial efficiencies and savings, and are specialized in TCO, business value assessments, and workload placement in production, non-production, cloud and on-premises environments. They also perform analytics, hybrid cloud, IT best practice benchmarks and chargeback assessments.