Essential Insight®
Scalable Architecture

Essential Insight has a scalable architecture to provide users with solutions to a myriad of data collection and/or error proofing problems. The system can be used to solve simple problems in a low cost fashion, and scaled up to handle large complex problems.

The Essential Insight system is available in two (2) versions, Essential Insight Lite and Essential Insight Server. The differences between the two are driven by the limitations of computer resources available as shown in the following table.

Feature	Essential Insight Lite	Essential Insight Server
Computer Operating System	Windows 2000, XP, Vista	Windows Server 2000, 2005, 2008
Database Management System	Windows SQL Sever Express	Windows SQL Server 2000, 2005, 2008
Number of Equipment Connections	16	45000
Number of Workstations	4	Unlimited
Portal Capability	Limited to Transactional Data	Transactional and Aggregate Data
System Role	Primary Only	Primary or Backup
All other features	Identical to Essential Insight Server	Identical to Esseential Insight Lite

Let's look at a hypothetical situation to demonstrate the scalability.

Suppose a user has a workstation or work cell where some error proofing is necessary and a production history recorded. Essential Insight Lite is installed and configured on an inexpensive desktop computer utilizing Microsoft XP and Microsoft SQL 2005 Express. In this example, the Essential Insight Lite configuration consists of a single workstation which runs the required error proofing logic and logs the data to the database as shown in Figure 1. The production history reports are available via web browser from the Portal on the workstation or work cell computer either locally or on the facility wide network if the workstation or work cell computer has been integrated into the facility network. The production history reports can contain not only the specific transactional data for work done on each work piece, but also information necessary to construct Overall Equipment Efficiency (OEE) data about the workstation or work cell. This is an acceptable solution for this situation where a simple and low cost solution is not only possible, but desired.
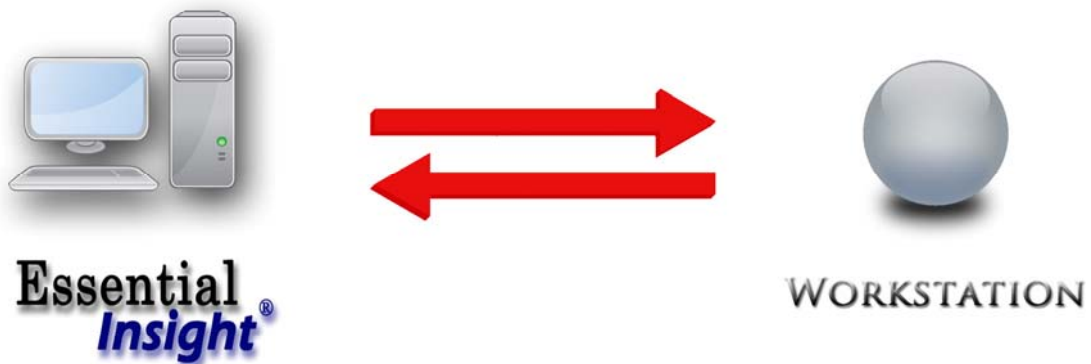
Figure 1

Let's assume the user is pleased with the results of the single workstation or work cell installation and decides to add a similar configuration to another workstation or work cell. That can be achieved by simply replicating the hardware and software configuration and making the modifications necessary to the workstation error proofing logic and logging to accommodate the specifics of the workstation or work cell process as shown in Figure 2. This is a perfectly acceptable simple and low cost solution with the caveat that the production history and OEE data are located on each local machine and are 'islands' of useful data. Again, this is perfectly acceptable, especially if the two workstation or work cells are independent and have no relationship in the production process to each other.

Figure 2

But what if the two workstations or work cells DO have a production process relationship? For example, suppose the work piece flows from workstation or work cell 1 to workstation or work cell 2? There is another configuration that could be applied rather than simple replication the hardware and software to accommodate another workstation. The original workstation or work cell computer configuration can be expanded to accommodate the additional workstation or work cell such that both workstations and work cells are controlled by the same computer as shown in Figure 3. The advantage of this is that the production history data and OEE data for both workstations and work cells now reside in the same database. This offers a powerful error proofing capability in that the downstream workstation to verify that work was completed successfully at the upstream workstation prior to commencing work. Additionally, the Portal is provided information to provide reports rich in data about not just the two individual workstations or work cells, but the interaction between the two workstations as well. The caveat is the workstation or work cell computer must be capable of handling the resource requirements of the Engine and the Portal simultaneously without impacting the operations at either workstation or work cell.
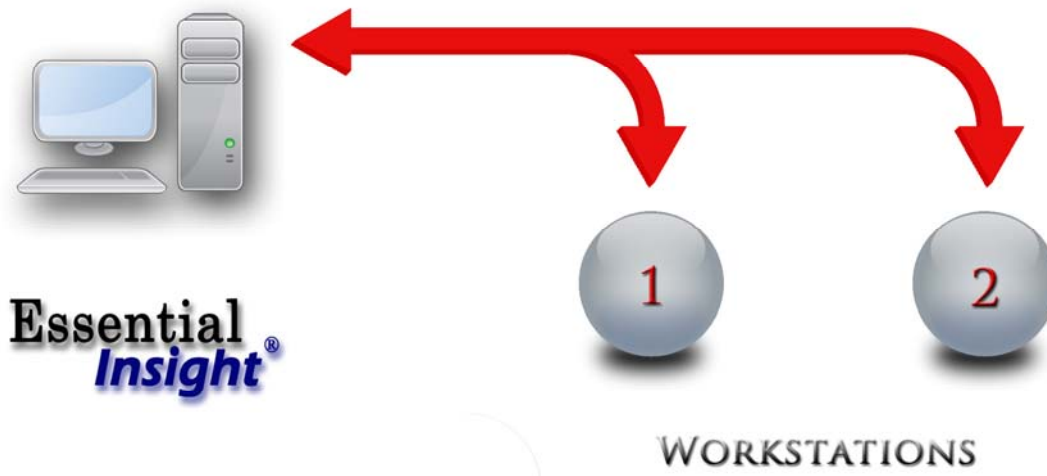
Figure 3

Now, let's extend the example further. Suppose the configuration in Figure 3 is successful and the user decides to extend the configuration to accommodate a number of workstations or work cells that constitute a complete production line. In this case, there is definitely a production process relationship between all the workstations or work cells, and it makes sense that all the individual workstation or work cell data be collected into a single database. This is not an issue for Essential Insight, however, now we need to look at the computer resources. Most likely the workstation or work cell computer we started out with has enough resources to run Essential Insight Lite. However, the limitations of operating system and database management system will necessitate the migration to Essential Insight Server and a server class computer to accommodate the volume of data we expect maintain for historical purposes. This configuration is shown in Figure 4.
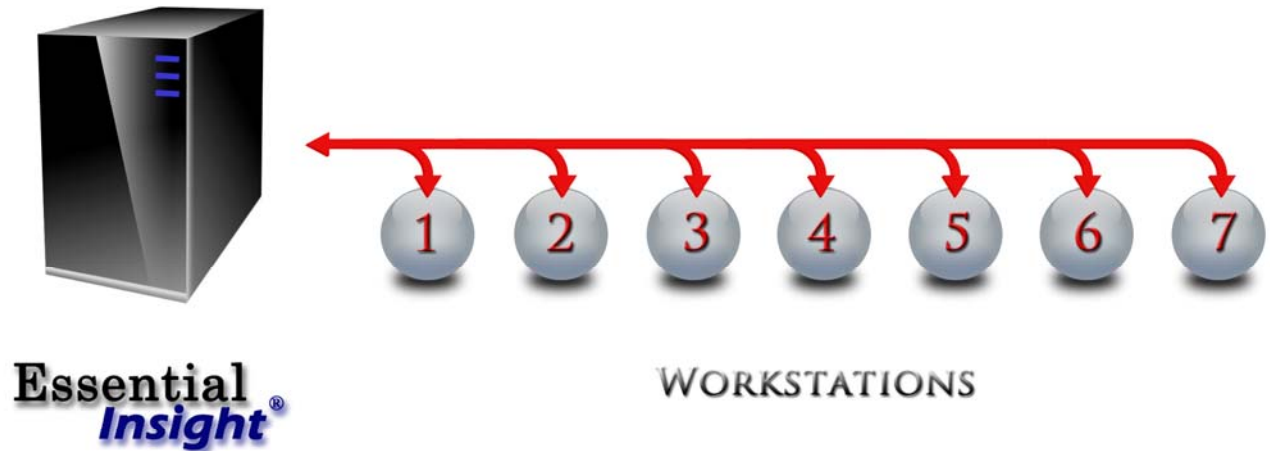
Figure 4

For our example, let's assume we choose to utilize our initial workstation or work cell computer configuration for a production line of seven (7) workstations or work cells as shown in Figure 5. In order to assure ourselves we have appropriate computer resources for the Engine and Portal's to perform at peak effeciency, we can take advantage of an Essential Insight Server feature by configuring one computer to be the 'primary' computer and replicate the hardware and software configuration on other computer called the 'backup'. This configuration allows the Engine to run on the primary computer and the Portal to run on the backup. In this configuration, every database transaction that occurs on the primary also occurs on the backup, thereby providing a copy of all the data on the backup. By separating the functionality of the system in this manner, we can be assured that the Engine and the Portal each have the resources available without competing with each other for computer resources. Importantly, a benefit of this configuration is should the data and operation of the production line be construed as 'mission critical' (think Just-In-Time), a backup machine with ALL the data is available in the unlikely event of a primary computer failure, and can be used to continue production while the primary is unavailable. Conversely, in the event of a backup computer failure, the primary machine will continue to log the data until such time the backup computer is again available and the data logged in the interim is uploaded to the backup to maintain coherent data sets on both machines.
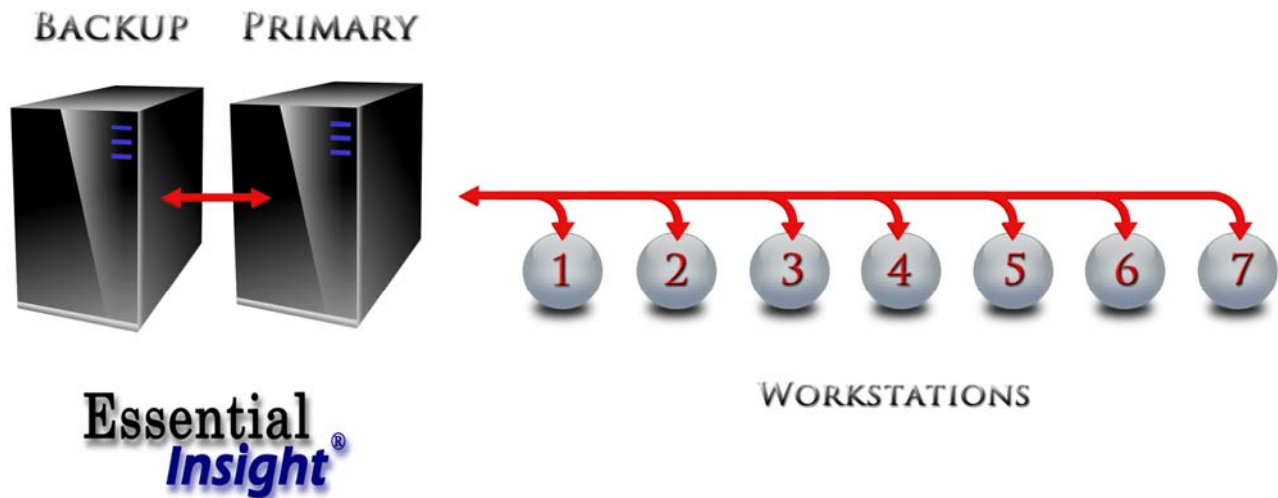
Figure 5

Let's extend our example yet again. Let's suppose the previous line was working so well, our user decides to extend it to the entire plant of three (3) lines as shown in Figure 6. One possible configuration is to simply replicate the hardware and software used on the single line example discussed previously. This is a straight forward solution, but a more cost effective solution is available. Essential Insight Server is not restricted to a single primary/backup configuration. Instead the system is configured such that a primary computer is assigned to each line, and each is backed up by a single enterprise class server backup computer. This 'heavy iron' machine would be available to run any line in the event of a primary machine failure and would allow the Portal to present production reports and transaction history on a plant wide basis. In the event the data is defined as mission critical and must be available online, another enterprise system can be configured to 'backup' the backup providing redundantly available data.
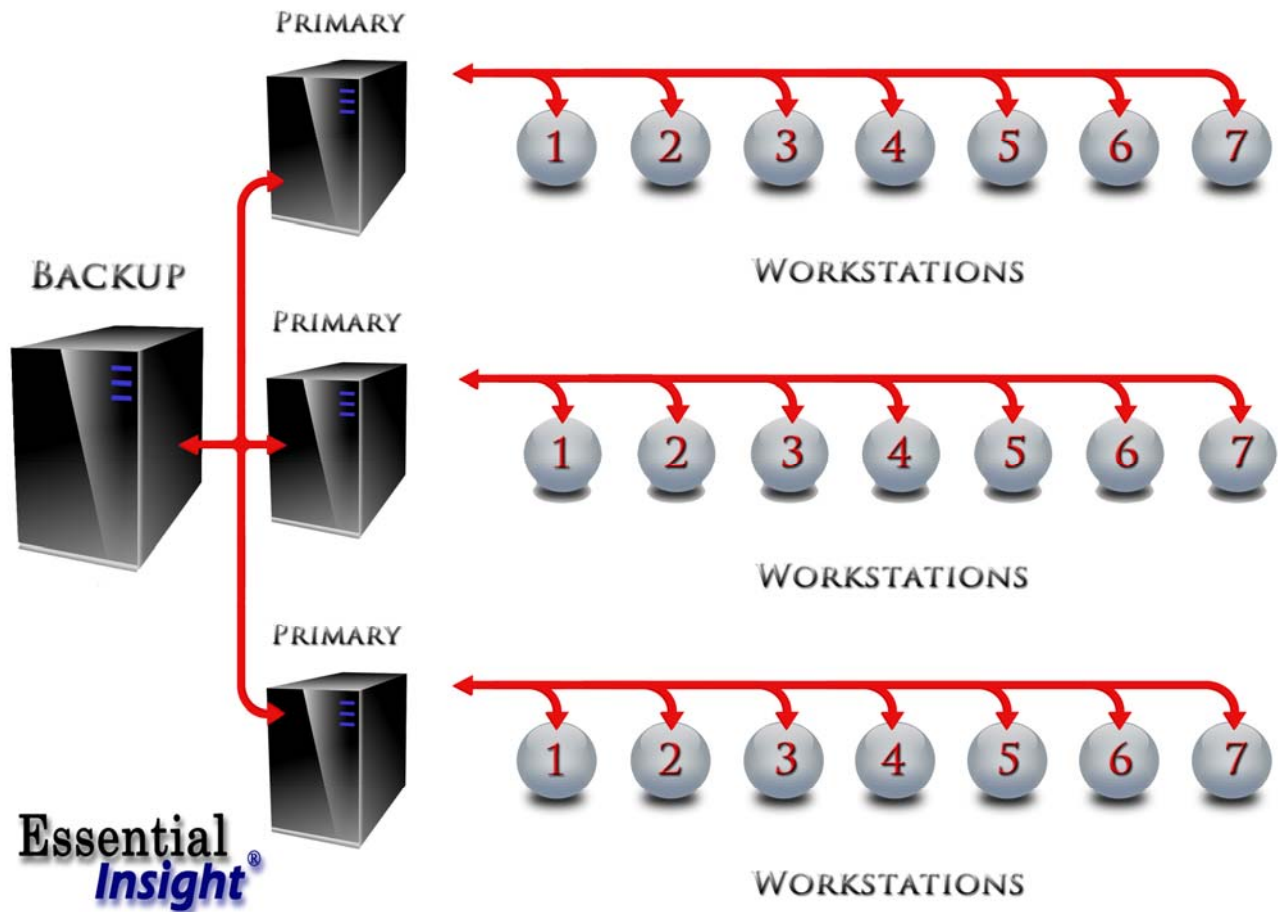
Figure 6

This white paper has defined the scalable architectures available with Essential Insight. It can be used in any of a myriad of configurations to meet the user's needs to provide Essential Insight into the production process to improve quality, increase efficiency, lower production costs, and improve profitability.