White Paper

Solving Complex, Time Consuming Tasks with Distributed Task Processing System

Within countries such as United States, industries involve continuous processes for product manufacture. The range of process industries is limited only to human imagination: pharmaceuticals and chemicals, oil and gas, food and beverages.

Process-plant construction is much too complex to be automated with off-the-shelf packaged solutions. The large and variable number of project participants, the enormous quantities of information to manage, and the fact that projects must generally be started without complete information, all make the automation of this process uniquely challenging.

It is not just a matter of installing some software. The automation tools must be integrated into work processes, and the work processes must be fine-tuned to take advantage of the automation. Only a software solution provider who has deep industry domain knowledge and implementation experience can bring the full power of lifecycle-management software to process industries. And the supplier cannot be a mere specialist problem-solver. To gain the substantial benefits of automation, process-plant owners must engage an experienced software supplier as a partner.

The Challenges

Process industries face significant, costly process automation challenges.

Hardware Costs Increase

For businesses implementing process automation and increasing overall system performance new hardware purchasing is cost-prohibitive. Powerful hardware is very expensive; even when the company needs to purchase several new servers for automation processes. It is not about the hardware itself – searching for the piece that meet company's needs best, approval procedure, shipping, installation - all this is a money and time consuming process.

Incomplete Usage of System Capabilities
Business automation process limitations often lead to the situations when system capabilities are not used to the full extent. For example, some processes are performed only on the server; while 200 workstations are used only for user tasks not distributed automation processes.

Software Licensing Cost Increase
Purchasing new hardware for process automation and improving overall system performance lead to software licensing cost increase. Similar to issues with purchasing new hardware, increasing software licenses does not deal with new software price only; but with time spent for installation, configuration and troubleshooting.

Low System Tasks Prioritization Capabilities
What is more important – processing Correspondence or New Loss documents? Is it possible for the system to automatically stop processing low-priority items in order to free the way for higher priority items? The answer can be critical to many process industries.

Software Management Cost Increase
Low prioritization capabilities, inability to use the system to full extent often are the reasons for expanding system administrators' staff. For each process company, with annual task throughput increase the number of human work performed for software administration lead to cost increase.

Inability to Force Immediate Task Execution
Inability to forbid the user performing other working tasks (such as writing emails, filling in timecards or surfing the Web for personal needs) unless the primary job tasks are completed, often leads to low performance and missed project schedule.

The Solution: Distributed Processing Systems

Distributed Processing Systems (DPS) can overcome the challenges of process industries, resulting in highly efficient business automation and greater profits.
The DPS provides possibility to execute predefined types of tasks remotely on any available resource in the Network.
DPS can be used for any kind of tasks execution, which require huge amount of CPU time as well as for building complex Multi Client – Multi Server solutions.

The Benefits

A highly efficient DPS can:

Reduce Costs

DPS result in lower costs by reducing a significant number of hardware and software necessary for particular tasks execution. With DPS, there is no need to purchase new costly hardware and software. No matter how complicated the industry's business is, with DPS, process companies do not need to hire large system administrators' staff for software and hardware maintenance.

Improve Process Management

A highly efficient DPS equates to less time required to complete the task. DPS can handle the mundane tasks of process management, rather than system administrators and management staff. Automatic tasks prioritization capabilities do not involve human interaction; as a result human error factor is eliminated.

Improve Overall System Performance

DPS benefits, such as using the system to full extent, forcing the user to complete the task in the first place before letting continue other work result in overall system performance increase.

Improve Satisfaction

An efficient industry operation eliminates unnecessary process management procedures enabling staff to focus on direct tasks. The result is greater job satisfaction and increased productivity for both management staff and executor staff.

The DexIk Solution – DexAgency

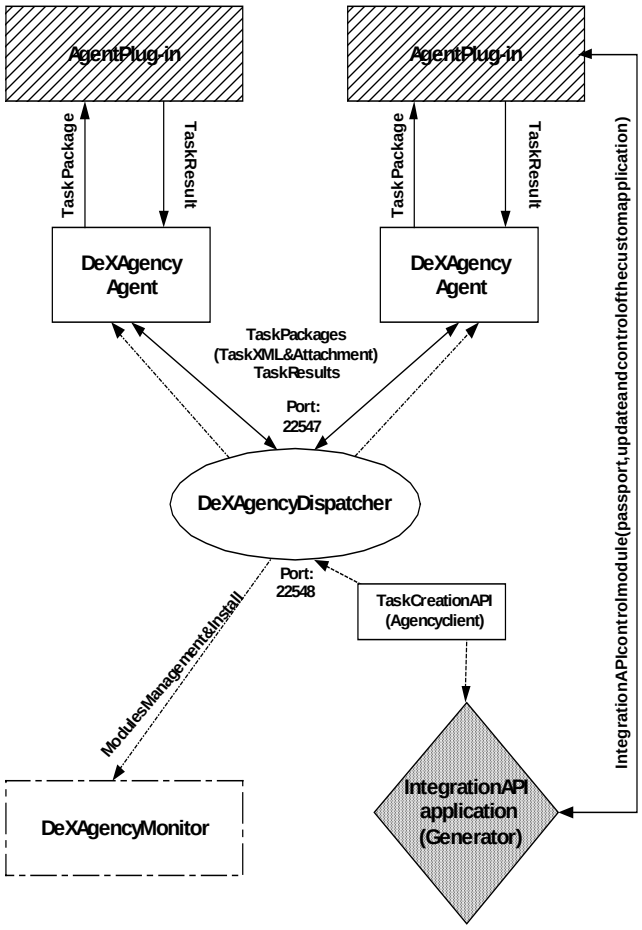
The DexAgency Distributed Task Processing System (DTPS) allows solving any business process automation challenges. DexAgency DTPS architecture provides efficient methods for solving the most difficult tasks with minimal to none additional hardware costs.
The main advantage of DexAgency DTPS is that it helps to utilize all the existing resources, including not only servers that run other applications and are not fully loaded, but even user workstations can become a part of the system. It allows companies to use all the "idle" time of existing infrastructure to perform any kind of tasks.
It may seem that controlling such a system would be a difficult task that will require special knowledge. The system was meant to be user-oriented from the very beginning and the management of the system should be centralized and simple. That was achieved by utilizing several basic concepts:

1. System should have a centralized tool that is able to manage and update configuration and contents of the remote system node.
2. Each of the system components should have the automatic update mechanism, similar to cell self-reproduction cycle.
3. Installation and update packages should have a centralized storage system to prevent version conflicts.

The DexAgency DTPS is based on the following standard components:
Task Agent – the application/service that runs on a separate node (computer system). One node can support multiple Agents. The Agent is responsible for task execution, result response to the task initiating application (DTPS API-based application and task plug-ins management).
Task Module (Plug-in) – the Plug-in DLL, residing on the same node as Agent. Plug-in is a task execution point. Agent controls Plug-ins, configuration and updates for those. When Plug-in is registered on the specific Agent, the Agent obtains the ability to recognize the tasks associated with the Plug-in and communicates that ability to Dispatcher.
Dispatcher – the application/service, that plays task coordinator role between Applications and Agents.
DTPS Watchdog – the application/service that performs controlling function on the Agent and Dispatcher.

The DexAgency DTPS should also have at least one on the following customisable components:
Distributed System API-Based Application (Application) – the custom application or Plug-in (for some general tasks; for example, conversion, OCR, FTS, File transfer, etc.), that uses DTPS API to create the task in DTPS and to obtain task execution result(s).

The following diagram shows the component interaction:



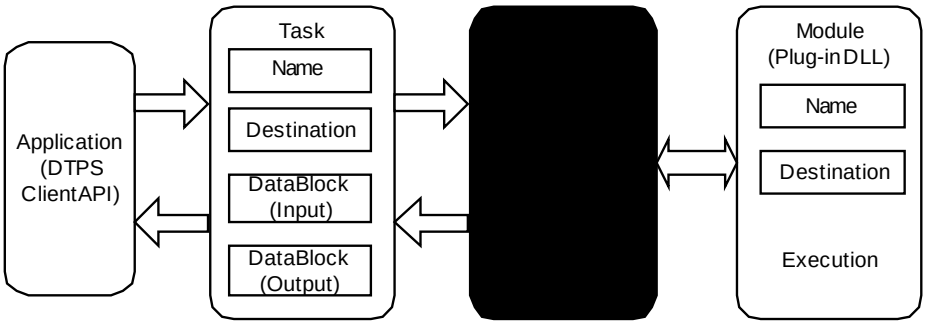
The basic algorithm looks as follows:

1. Application (Generator) constructs the Request of Specific Task Execution. The request is formed as an XML-file or binary file.
2. Application submits a single request or group of requests to the Dispatcher using the DexAgency DTPS client API.
3. Dispatcher based on task type and information about connected Agents, busy state and available modules for each Agent, distributes the Task for execution to one of available Agents.
4. Agent receives a task request and its attachment, and passes the information to the corresponding Module.
5. Module executes the task and creates a response passed to the Agent and then to Dispatcher.
6. Dispatcher submits the response to the Application that initiated the request.

Task

From the Application point of view the DexAgency DTPS is a Black Box, which could be used to execute some procedures remotely. In most cases the procedure has input and output. Input is formed by user application. The Task could be the XML-file, Image or any kind of data. In addition, the task must have a unique Name, which will identify the necessary Module on Agency side. After executing the task, the Application receives execution result. In some cases, you might need to distribute task not to any available Agents, which have necessary Module installed, but to exact module. For such situation, Task has a Destination property. In other words, the task could be either broadcast, or created to reach specific destination.

The following diagram represents generic custom solution schema built on DTPS:



It is obvious, that Application should form an Input understandable for Module, which will execute the Task. Module should form a response understandable by the Application. That means that every application that generates tasks must have the module that is able to process those and vice versa.

Conclusion

For corporations seeking processes automation using Distributed Process Systems, no other product delivers like the DexAgency DTPS. With advanced management capabilities, comprehensive monitoring and analysis, high prioritisation capabilities, the DexAgency DTPS will cut corporate costs, increase overall performance and improve satisfaction.

The DexAgency DTPS is perfect for solving challenges in the following industries:

- Customer requests processing centre (insurance, medical, financial, etc.)
- Document workflow system
- Call centre
- Complex 3D recognition engine

The DexAgency DTPS has the best practice working with different document workflow systems.