SGI® Star-P™ Software

The Simple Way to Program in Parallel

Software Highlights

- Enables desktop apps to use remote HPC systems
- Supports bigger problems and faster execution than the desktop
- Addresses multi-core and multi-processor systems
- MATLAB client allows high reuse of existing code

Enables Simple Parallel Programming of Powerful Altix Systems

Leveraging both fine- and coarse-grained parallelization is necessary in the vast majority of complex HPC algorithms. SGI Star-P software enables users to work in both a global and distributed format, and to interoperate between the two. Star-P software's coarse-grained mode is ideally suited for parallelization of algorithms that are often called "embarrassingly parallel," where computations can be naturally broken up into largely independent processes, such as Monte Carlo simulation or parallelization of FOR loops. The software's fine-grained mode enables parallelization of algorithms that require large-scale memory access and inter-processor communication, such as those found in matrix manipulation and signal processing applications. Through fine-grained control, Star-P revolutionizes model development and refinement. Compiled programs no longer need to be run in overnight batch runs. Instead, just the portion of the code in question can be run, dramatically speeding up response time, and enabling rapid iterations.

Leverages Desktop Productivity Combined with SGI Industry-leading Compute Power for Shortened Time-to-solution

Through a client-server model, SGI Star-P acts as a bridge between certain popular scientific and engineering desktop computing tools, like MATLAB® by Mathworks, and the parallel computing capability of an SGI Altix or Altix XE server or cluster. The direct connection means that users can work with familiar desktop tools while leveraging SGI Altix platform's large single-system image, massive globally shared memory and ultra-high bandwidth NUMAflex™ architecture, or powerful SGI Altix XE scale-out clusters. Results are delivered in real-time, and engineers and scientists are able to dramatically accelerate algorithm prototyping and model development with minimal programming effort. The SGI Star-P software therefore fundamentally transforms workflows, substantially shortening the time-to-solution, and delivers the best of both worlds – the interactive and familiar use of a desktop application coupled with the computing power of Altix servers.

Simplifies MATLAB Usage with Automatic and Transparent Parallelization

The SGI Star-P software greatly simplifies the parallelization of new and existing MATLAB code by allowing the user to either run MATLAB code locally on a desktop or on an SGI server or cluster. By insertion of the `*p` operand in a variable declaration, a user can easily create parallel data structures without worrying about data sharing or synchronization. This means that existing MATLAB scripts can be reused to run larger problems in parallel with minimal modification, eliminating the re-programming expense associated with porting desktop application code to high performance computers.

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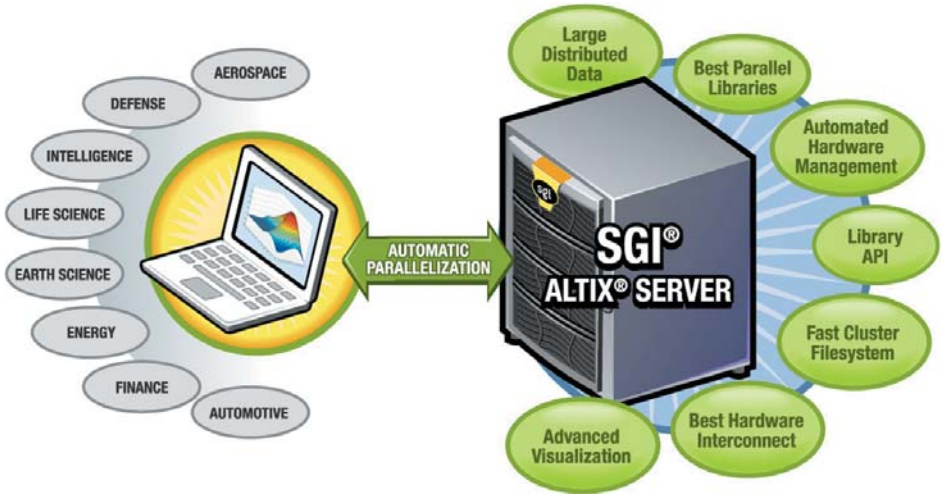


Operating Systems

Star-P clients

- SUSE® Linux Enterprise Server™ version 9.2 or higher
- Red Hat® Enterprise Linux® version 4.1 or higher
- Microsoft® Windows® XP

Star-P server software

- SUSE Linux Enteprise Server version 9 or higher with SGI ProPack

Platforms

All SGI Altix or SGI Altix XE servers or clusters

Support and Services

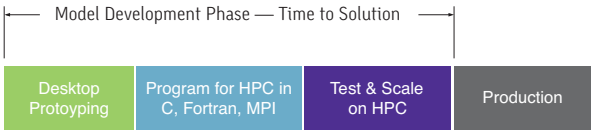
SGI provides full support for SGI Star-P software. SGI Professional Services also offers services to implement and integrate Star-P into your environment. For more information, please contact your SGI representative.

Insertion of the *p Operand:

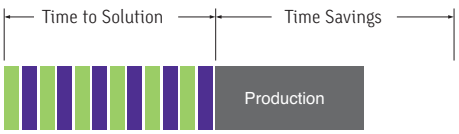
```
% explicitly parallel with *p
n = 10000*p

% implicitly parallel
A = rand(n, n);

% implicitly parallel
x = randn(n, 1);

% implicitly parallel
y = zeros(size(x));

while norm(x-y) / norm (x) > 1e-11
    y = x;
    x = A*x;
    x = x / norm(x);
end;
```

Simple MATLAB script for finding the eigenvector of a random matrix. Adding the *p construct makes variables parallel. Through propagation, related variables also become parallel. Functions on parallel variables are transparently “overloaded” and outsourced to the HPC.

Batch Workflow:



Interactive Workflow:



SGI Star-P software eliminates the HPC recoding typically found in the batch workflow (left), instead enabling an interactive workflow (right), with rapid iterations, and dramatically reducing the time-to-solution.

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