# OfficeGRID ®

MESH-Technologies

Grid Computing! The phrase has been hyped beyond belief the last few years. Apparently there is no limit to the resources one may harvest from the hardly utilized pool of office PCs. Sadly, very few success stories have emerged from intensive attack on the wasted PC compute-cycles. In fact Tom Tabor, publisher of GRIDtoday, recently warned that the hype - that currently presents Grid Computing as a Silver Bullet in the fight for processing power - may end up harming the Grid vision, simply because it fails to deliver real solutions to users.

So what stops us from utilizing the potential of the Grid model? The resources that are claimed to be there really do exist, so something must be stopping us from using them.

In this document and the TMem White Paper (contact MESH-Technologies for a copy) we explain some of the common problems found in Grid computing and how MESH-Technologies' OfficeGRID, and the TMem kernel on which it is built, solve these problems. Thereby OfficeGRID provides a grid programming model that delivers real value to its customers.

**OfficeGRID:**
• takes grid computing beyond simple batch systems
• increases ROI by utilizing idle time on existing hardware
• is high performance parallel computing made easy
• employs efficient distributed shared memory technology
• reduces time to market
• offers low startup cost for developers and customers
• enables on demand computational power
• allows cross platform development and deployment
• unifies application development and execution on clusters and LANs
• integrates easily with existing applications
• supports C and Fortran 77
• raises the bar for grid integration of your applications

## OfficeGRID Computing

Grid computing is the concept of pooling existing computing resources into a virtual supercomputer. If possible this will allow for a much better cost/benefit ratio, than additional investments in scientific computing resources.

The concept of grids of office computers is especially desirable for many enterprises. One can look at a department or division in a corporation as a computational unit. The structure of todays businesses implies a heterogeneous setup and machine park - as well as centralized management. In addition the internal network of computers in an office is normally trusted and thought of as secure. The centralized management and the trusted status of the computers make the task of joining the power of the office computers more manageable, while the heterogeneous nature of the network is an obstacle.
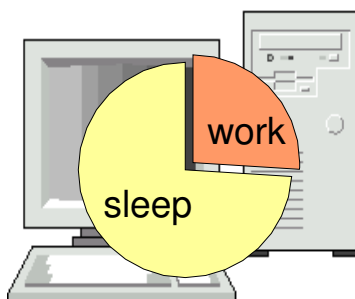


Most offices are not populated outside normal working hours, 8am to 4pm on working days this implies that the computing resources are unused around 128 out of 168 hours each week.

The vision of MESH-Technologies is to allow for the constructive use of these hours of wasted time. Would you allow any other of your companys resources to be utilized less than 25%?

# OfficeGRID ®

OfficeGRID from MESH-Technologies glues this pool of unused computational power together, thus making it possible to utilize the unused 75% (or more) computer time. OfficeGRID accomplishes this by using MESH-Technologies' TMem, which is described in the TMem White Paper.

OfficeGRID contains a system that allows the user to start jobs that run on many computers with a single OfficeGRID command and collect the results on his local computer, thereby giving him an easy way to use the grid of office computers as a supercomputer.

OfficeGRID can be run explicitly at any time or it can be limited to run when the screen saver on a given computer is running – that is, when the user is not using it. This gives the possibility to ensure that OfficeGRID will not bother the user, while still running more than 75% of the time.

## Networks are Dynamic and Heterogeneous

When running grid applications one faces two hard issues:

• Networks are dynamic.

• Networks are heterogeneous.

Since OfficeGRID is build on TMem it inherits TMem's error tolerant design, that allows computers to join and leave the network while it is running, thus resolving the first issue.

The networks in many organizations are heterogeneous and it might consist of PCs with different versions of Windows and Linux, some workstations or servers running some version of Unix, and perhaps also clusters. Thus issue 2 is a very real problem.

OfficeGRID is designed to address this problem, and to allow these different platforms to work together on a single task.
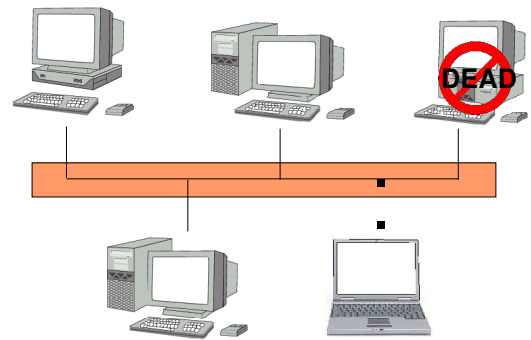
## The OfficeGRID Development Package

Because OfficeGRID is built on TMem it can do much more than allow the user to start jobs on many computers. Programs implemented to explicitly utilize OfficeGRIDs many unique features will be able to use the computational pool of office computers notably better. This is why MESH-Technologies offers a special OfficeGRID Development Package for developers who want to construct their own OfficeGRID applications. The OfficeGRID Development Package includes:

• **The TMem core:** This is necessary in order to run OfficeGRID applications.
• **The TMem libraries:** Enables you to build OfficeGRID applications. Both the C/C++ and the Fortran 77 programming languages are supported and included in this package.
• **An OfficeGRID screensaver container:** A generic screen saver that can call OfficeGRID applications utilizing an included screen saver library. The screen saver library has a very simple and clean interface.

- **Extensive documentation:** This includes an extensive TMem Documentation, TMem Developer Advice and more.
- **A set of development licenses:** Contact MESH-Technologies for the desired number of development licenses.

It is also possible to extend the functionality of the OfficeGRID Development Package through what is known as TMem semantic filters. Semantic filters are described in the TMem White Paper. For a list of the available TMem semantic filters contact MESH-Technologies.

There is both a Windows and a Linux version of the OfficeGRID Development Package available and complete interoperability of the two is possible. This makes it possible to develop OfficeGRID applications that will run on both the Windows and the Linux operating system as well as a mix of them. Contact MESH-Technologies if you want to run OfficeGRID on other platforms (e.g. Mac OSX or Solaris).

## An OfficeGRID Application Example

OfficeGRID BLAST is an OfficeGRID application, which has been developed by using the OfficeGRID Development Package. BLAST is an algorithm that is used to compare biological sequences, such as DNA sequences of different genes or the amino-acid sequence of different proteins. Several computer programs that implement the BLAST algorithm has been created, but generally these BLAST implementations are not built to run in parallel on several computational hosts. This is a problem because BLAST normally has a very long running time and requires a lot of memory to run efficiently.

OfficeGRID BLAST is a parallellization of NCBI BLAST, which is developed by the U.S. National Center for Biotechnology Information. For more information about OfficeGRID BLAST see the OfficeGRID BLAST White Paper (see www.meshtechnologies.com/OfficeGRID-BLAST).

## More Information on OfficeGRID

Further information on OfficeGRID is available from MESH-Technologies, contact information can be found below. The TMem White Paper explains the technology on which OfficeGRID is built, this white paper is accessible by contacting MESH-Technologies A/S.

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