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## FPU (Floating-Point Unit): Benefits

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### TOPIC -----

This article describes the benefits of Floating-point Units, also known as FPUs or math coprocessors.

### DISCUSSION -----

#### What Kind of Applications Benefit Most -----

Floating-point Units (FPUs or math coprocessors), such as the 68881/68882, offer the greatest benefit in applications that tend to be very floating-point (arithmetic) intensive. The specific types of applications that benefit most from an FPU are those that process large amounts of floating-point instructions for precision, and will utilize an FPU extensively. Examples are CAD/CAM, 3-D modeling, scientific applications, and financial applications.

To realize the full potential of an FPU, applications must access the FPU directly by using MC68881/MC68882 assembly language instructions, or by using the MC68881/MC68882 compiler option when programs are created. Programs thus achieve a speed gain anywhere from 40 to 700 times in processing floating-point instructions.

Applications that do not access the FPU directly can still realize a significant gain in calculation speed if they use SANE (Standard Apple Numerics Environment). SANE automatically calls on an FPU, if one is present, yielding a speed increase from 5 to 50 times.

#### Applications That Benefit Less -----

With desktop publishing (DTP) applications, the use of floating-point arithmetic is limited, and the overall gain from an FPU will be minimal. In applications such as video, QuickTime, or pre-press color, most of the calculations involved are on large amounts of integer data, and speed gain from an FPU will be minimal, if any.

#### How To Tell the Difference -----

In most cases, to determine the use of an FPU or SANE by an application, you need contact the software developer. Some applications are more explicit: they check for an FPU and inform the user. For example, Excel states in its "About..." box whether a math coprocessor is present.  
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