



Processing Unit Having a Decimal Floating-Point Divider Using Newton-Raphson Iteration

[View U.S. Patent No. 7,467,174 in PDF format.](#)

WARF: P04398US

Inventors: Michael Schulte, Liang-Kai Wang

The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a high-speed method for dividing decimal floating-point numbers.

Overview

Most decimal dividers are for fixed-point (typically integer) decimal data. They cannot be directly applied to floating-point decimal dividers; require time-consuming and error-prone scaling when working with numbers of different magnitudes; and use digit recurrence algorithms, which compute only a single digit of the result during each iteration. On the other hand, most floating-point dividers use binary, rather than decimal, arithmetic. Because most data are in decimal form, they must be converted to binary data, processed and then converted back to decimal, which is a time-consuming process that often introduces unacceptable errors.

The Invention

UW-Madison researchers have developed a high-speed method for dividing decimal floating-point numbers. The technology uses an accurate piecewise linear approximation to obtain an initial estimate of the divisor's reciprocal. The initial estimate is then improved using a modified form of Newton-Raphson iteration. Finally, the divisor's reciprocal is multiplied by the dividend and efficiently rounded to produce the quotient.

Applications

- Dividing decimal floating-point numbers

Key Benefits

- Significantly faster than current methods
- Avoids errors resulting from conversions between binary and decimal form
- Achieves accurate decimal division in relatively few iterations: Newton-Raphson iteration approximately doubles the number of accurate digits during each iteration
- Uses operand modification and decimal encoding to reduce memory requirements
- Avoids scaling problems associated with fixed-point dividers
- Can be modified for decimal fixed-point numbers

Additional Information

Related Technologies

We use cookies on this site to enhance your experience and improve our marketing efforts. By continuing to browse without changing your browser settings to block or delete cookies, you agree to the storing of cookies and related technologies on your device. [See our privacy policy.](#)

- [See WARF reference number P04398US for more information on this technology.](#)

Tech Fields

OK



WARF
Wisconsin Alumni Research Foundation

| info@warf.org | 608.960.9850

- [Information Technology : Computing methods, software & machine learning](#)

For current licensing status, please contact Emily Bauer at emily@warf.org or 608-960-9842

We use cookies on this site to enhance your experience and improve our marketing efforts. By continuing to browse without changing your browser settings to block or delete cookies, you agree to the storing of cookies and related technologies on your device. [See our privacy policy.](#)

OK



WARF
Wisconsin Alumni Research Foundation

| info@warf.org | 608.960.9850