

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

Paper No. 22

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte CALVIN J. BITTNER, BERTRAND M. GROSSMAN,
RICHARD D. JENKS,
STEPHEN M. WATT, and RICHARD Q. WILLIAMS

Appeal No. 1998-3398
Application No. 08/634,515

ON BRIEF

Before BARRETT, GROSS, and BARRY, Administrative Patent Judges.
GROSS, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal from the examiner's final rejection of claims 1 through 18, which are all of the claims pending in this application.

Appellants' invention relates to a method and apparatus for optimizing a compiler program in a computer system. In particular, the apparatus includes means for augmenting mathematical functions in a source program, wherein the augmentation means is interposed and internal to phases of the

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compiler or, rather, interposed with an optimizer. Claim 1 is illustrative of the claimed invention, and it reads as follows:

1. A method for optimizing and transforming a compiler program in a computer system, the method comprising the steps of:

(1) constructing a compiler having means for utilizing global dependency information and redundant expression elimination to augment mathematical functions in a source program; and

(2) locating said augmentation means interposed and internal to phases of the compiler standard compilation process to access said global dependency information.

The prior art references of record relied upon by the examiner in rejecting the appealed claims are:

Cocke et al. (Cocke) 1989	4,802,091	Jan. 31,
Hayashi et al. (Hayashi) 07, 1995	5,396,631	Mar.
		(filed Aug. 31, 1993)
Morgan 1995	5,428,805	Jun. 27,
		(filed Dec. 22, 1992)

Louis B. Rall, "Automatic Differentiation: Techniques and Applications," Lecture Notes in Computer Science, Vol. 120, Springer-Verlag, NY (1981), pp. 1-111. (Rall)

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Claims 1 through 18 stand rejected under 35 U.S.C. § 103 as being unpatentable over Hayashi in view of Morgan and Cocke.

Claims 1 through 18 stand rejected under 35 U.S.C. § 103 as being unpatentable over Hayashi in view of Rall and Cocke.

Reference is made to the Examiner's Answer (Paper No. 21, mailed May 11, 1998) for the examiner's complete reasoning in support of the rejections, and to appellants' Brief (Paper No. 20, filed April 22, 1998) for appellants' arguments thereagainst.

OPINION

As a preliminary matter, we note that appellants indicate on page 6 of the Brief that the claims are to stand or fall together. We will treat the claims according to two groups, claims 1 through 11, with independent claim 1 as representative, and claims 12 through 18, with independent claim 12 as representative.

We have carefully considered the claims, the applied prior art references, and the respective positions articulated by appellants and the examiner. As a consequence of our

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review, we will reverse the obviousness rejections of claims 1 through 11 and affirm the obviousness rejections of claims 12 through 18.

Regarding representative claim 1, appellants contend (Brief, pages 7-8) that "Hayashi neither teaches nor suggests program augmentation via global dependency information and redundant expression elimination as recited in claim 1, but rather, is directed to optimizing isolated program structures such as loops and conditional statements such as described in Column 7, lines 14-25 of Hayashi et al." Appellants continue, "Hayashi

et al. is not concerned with the augmentation of mathematical functions during a compiler optimization process."

The examiner turns to Morgan or Rall to suggest augmentation of mathematical functions, but admits that the combination of Hayashi and Morgan (Answer, page 4) and the combination of Hayashi and Rall (Answer, page 5) do "not explicitly disclose utilizing global dependency information and redundant expression elimination to optimize (i.e.,

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augment) source code." The examiner relies upon Cocks to remedy this deficiency. In particular, the examiner asserts (Answer, pages 4 and 6) that Cocks "discloses utilizing global dependency information and redundant expression elimination to optimize (i.e., augment) source code." Also, the examiner takes Official Notice "that the use of global dependency information and redundant expression elimination (e.g., loop optimization algorithms) are well known in the compiler art and do not constitute patentably distinct limitations."

We find no teaching or suggestion in Cocks as to why the skilled artisan would use the specific augmentation methods of global dependency information and redundant expression elimination. Further, the Court has held that "[w]ith respect to

core factual findings in a determination of patentability, however, the Board cannot simply reach conclusions based on its own understanding or experience -- or on its assessment of what would be basic knowledge or common sense." *In re Zurko*,

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No. 96-1258 (Fed. Cir. August 2, 2001). Thus, we will not accept the examiner's taking of Official Notice without any evidence to support the assertion as motivation for modifying Hayashi. As the combination of Hayashi, Cocke, and either Morgan or Rall fails to disclose each and every claim limitation, the examiner has failed to establish a *prima facie* case of obviousness. Consequently, we cannot affirm the rejections of claim 1 and its dependents, claims 2 through 11.

As to claim 12, Hayashi appears to include a front end (2), an intermediate language generator (between elements 2 and 4), an optimizer (4), and a back end. Further, the compiler must include a symbol-information table or data structure to define the symbols to be used for the program. As to the means for augmenting mathematical functions, Hayashi discloses (column 9, lines 29-36) that one optimization function changes an instruction into another of higher speed "for example, changing a

multiplication instruction into a repetition of addition." We

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see no reason why this optimization function would not meet the claim limitation of augmenting mathematical functions, as broadly recited in the claim, particularly as no arguments have been presented to convince us otherwise. Therefore, Hayashi appears to meet all of the limitations of claim 12, with Cocks and either Morgan or Rall merely being cumulative. Although the rejection is based on a combination of references, it is permissible to affirm the rejection relying on only one. See *In re Bush*, 296 F.2d 491, 496, 131 USPQ 263, 266-67 (CCPA 1961). Accordingly, we will affirm the rejections of claim 12 and its dependents, claims 13 through 18.

CONCLUSION

The decision of the examiner rejecting claims 1 through 18 under 35 U.S.C. § 103 is reversed as to claims 1 through 11 and affirmed as to claims 12 through 18.

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No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED-IN-PART

LEE E. BARRETT)	
Administrative Patent Judge)	
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)	BOARD OF PATENT
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)	INTERFERENCES
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LANCE LEONARD BARRY)	
Administrative Patent Judge)	

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