

THIS OPINION WAS NOT WRITTEN FOR PUBLICATION

The opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.

Paper No. 25

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte ROBERT J. DONOVAN,
DANIEL R. HICKS,
JAMES A. KRYKA,
DAVID J. LAMBERT,
and ROBERT R. ROEDIGER

Appeal No. 1997-2466
Application No. 08/461,943¹

ON BRIEF

Before KRASS, FLEMING, and BARRY, Administrative Patent Judges.
BARRY, Administrative Patent Judge.

¹ The application was filed June 5, 1995. According to appellants, this application is a continuation of Application Serial No. 08/006,098, which was filed January 15, 1993 and is now abandoned.

DECISION ON APPEAL

This is a decision on the appeal under 35 U.S.C. § 134 from the final rejection of claims 1, 2, 4-9, and 11-18. We affirm-in-part.

BACKGROUND

The invention at issue in this appeal relates to optimized compiling. A compiler generally converts a source program into object code. An optimizing compiler also eliminates code that is unnecessary for the execution of a procedure being compiled. Many optimizing compilers, however, ineffectively process asynchronous events such as program exceptions. The invention improves the processing of asynchronous events by defining visibility boundaries in compiled code of an optimization compiler. The visibility boundaries are identified by inserting pseudo operations into an intermediate representation of the source code.

Claim 18, which is representative for our purposes, follows:

18. A digital computer implemented method for converting a source program to an object code comprising the steps of:

receiving the source program;

generating a first intermediate representation of the source program;

identifying from either compiler directive or syntax at a selected point in said first intermediate representation of the source program a possible asynchronous activity;

inserting a pseudo operation responsive to identifying said possible asynchronous activity for a selected variable at said selected point in said first intermediate representation of the source program;

processing sequential operations of said first intermediate representation including said pseudo operation and defining an internal data structure of the source program;

processing said defined internal data structure and generating an optimizer data structure.

The references relied on by the patent examiner in rejecting the claims follow:

James R. Cordy (Cordy), "Compile-Time Detection of Aliasing in Euclid Programs," Software-Practice and Experience, Vol. 14(8), pp. 755-768 (1984)

Arthur B. Pyster (Pyster), "Compiler Design and Construction," pp. 11-13, 21 and 130, (1980).

Claims 1, 2, 4-9, and 11-18 stand rejected under 35 U.S.C. § 103 as obvious over Pyster in view of Cordy. Rather than repeat the arguments of the appellants or examiner in toto, we refer the reader to the appeal and reply briefs and the examiner's answer for the respective details thereof.

OPINION

In reaching our decision in this appeal, we considered the subject matter on appeal and the rejection and evidence advanced by the examiner. We also considered the arguments of the appellants and examiner. After considering the record before us, it is our view that the evidence and level of skill in the art would have suggested to one of ordinary skill in the art the invention of claims 1, 8, 9, 11, 12, 17, and 18. We cannot say, however, that the evidence and level of skill in the art would have suggested the invention of claims 2, 4-7, and 13-16. Accordingly, we affirm-in-part.

We begin our consideration of the obviousness of the claims by finding that the references represent the level of ordinary skill in the art. See In re GPAC Inc., 57 F.3d 1573, 1579, 35 USPQ2d 1116, 1121 (Fed. Cir. 1995) (finding that the Board of Patent Appeals and Interference did not err in concluding that the level of ordinary skill in the art was best determined by the references of record); In re Oelrich, 579 F.2d 86, 91, 198 USPQ 210, 214 (CCPA 1978) ("[T]he PTO usually must evaluate ... the level of ordinary skill solely

on the cold words of the literature."). Of course, every patent application and reference relies on the knowledge of persons skilled in the art to complement that which is disclosed therein. In re Bode, 550 F.2d 656, 660, 193 USPQ 12, 16 (CCPA 1977). Persons skilled in the art, moreover, must be presumed to know something about the art apart from what the references disclose. In re Jacoby, 309 F.2d 513, 516, 135 USPQ 317, 319 (CCPA 1962). With this in mind, we address the obviousness of claims 1, 8, 9, 11, 12, 17, and 18 and the obviousness of claims 2, 4-7, and 13-16 seriatim.

Obviousness of Claims 1, 8, 9, 11, 12, 17, and 18

Regarding the obviousness of claim 1, the appellants make two arguments. We address these one-by-one. First, the appellants argue, "[t]he legality assertion of Cordy, is detectable as run time error, and does not add information to the internal data structure of the program." (Appeal Br. at 15.) They also make essentially the same argument for claim 11. (Id. at 17-19.) In response, the examiner asserts, "[t]he internal data structure of the source program including a corresponding visibility boundary is taught by Cordy where.

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e.g., [sic] the legality assertions when associated with a
procedure and bindings

create a boundary that is visible to the compiler during compilation around the declared variables (page 760 of Cordy)." (Examiner's Answer at 11.)

During patent examination, pending claims must be given their broadest reasonable interpretation. Limitations from the specification are not to be read into the claims. In re Van Geuns, 988 F.2d 1181, 1184, 26 USPQ2d 1057, 1059 (Fed. Cir. 1993); In re Prater, 415 F.2d 1393, 1404, 162 USPQ 541, 550 (CCPA 1969).

Giving claims 1 and 11 their broadest reasonable interpretation, we find that claimed invention does not define over the references. Claim 1 specifies in pertinent part "inserting a pseudo operation in said first intermediate representation representing a predetermined event" and "processing sequential operations of said first intermediate representation including said inserted pseudo operation and defining an internal data structure of the source program including a corresponding visibility boundary for said inserted pseudo operation in said first intermediate

representation" Claim 11 specifies in pertinent part "means for inserting a pseudo operation representing a predetermined event in said first intermediate representation" and "means responsive to processing said inserted pseudo operation for defining a visibility boundary" In short, the claims recite inserting a pseudo operation in an intermediate representation of a source program and defining a visibility boundary for the inserted pseudo operation.

Pyster "describes the state of compiler art." (Appeal Br. at 11.) Figure 1-6 of the reference depicts the transformation of source code into object code "by a series of transformations of it" P. 11. The transformations include scanning source code, Fig. 1-6, which has been input into a compiler; generating an intermediate code representing the source code, Id., processing the intermediate code to generate an optimized intermediate representation, Figs. 1-6 and 1-14; and processing said optimized intermediate representation to generate the object code. Fig. 1-6, P. 21.

Cordy discloses compile-time detection of potential aliases in computer programs. P. 755. The reference teaches, "[a]liasing is dangerous because it obscures the meaning of the assignment operator in that an assignment to one variable may change the observed value of others." Id. Cordy's compiler generates and inserts legality assertions to ensure that aliasing does not occur at run time. Upon encountering the bind statement "**bind (var x to a(i), var y to a(j),)**" for example, the legality assertion "**assert (i not = j)**" is inserted preceding the bind. P. 765. A legality assertion creates a boundary between the statements that precede the assertion and those that follow it. The boundary is visible to the compiler during compilation. When the teachings of the references are combined, the result is the insertion of a pseudo operation in an intermediate representation of a source program and the definition of a visibility boundary for the inserted pseudo operation. Therefore, we find that the references would have suggested the elements of claims 1 and 11.

Second, the appellants argue, "the modification of the [sic] Pyster to include the total teachings of Cordy as proposed by the Examiner is the result of application of impermissible hindsight" (Appeal Br. at 16.) In response, the examiner observes, "Pyster describes the state of the art in a compiler overview and it is very similar to the prior art description given by the applicants. Cordy's compile-time detection algorithms is [sic] designed for use with compilers" (Examiner's Answer at 11.)

We find that one having ordinary skill in the art would have been motivated to combine Cordy with Pyster. Any judgment on obviousness is necessarily a reconstruction based on hindsight. If the judgment takes into account only knowledge that was within the level of ordinary skill at the time an invention was made and does not include knowledge gleaned only from an appellant's disclosure such a reconstruction is proper. In re McLaughlin, 443 F.2d 1392, 1395, 170 USPQ 209, 212 (CCPA 1971); Radix Corp. v. Samuels, 13 USPQ2d 1689, 1693 (D.D.C. 1989). Here, the examiner concludes that one of ordinary skill in the art would have

been motivated to employ Cordy's legality assertions in Pyster's intermediate code "because these assertions verify conditions in a program and prevent aliasing of variables that could cause erroneous run-time program results." (Final Rejection at 4.) His conclusion is based on Cordy's teaching of the problem and detection of aliasing. It does not include knowledge gleaned only from the appellants' disclosure. Therefore, we find that the combination is proper.

When the patentability of dependent claims is not argued separately, the claims stand or fall with the claims from which they depend. In re King, 801 F.2d 1324, 1325, 231 USPQ 136, 137 (Fed. Cir. 1986); In re Sernaker, 702 F.2d 989, 991, 217 USPQ 1, 3 (Fed. Cir. 1983). Here, the appellants do not argue separately the patentability of claims 8 and 9, which depend from claim 1, or of claims 12 and 17, which depend from claim 11. To the contrary, they insist that claims 1, 8, and 9 stand or fall together and that claims 11, 12, and 17 stand or fall together. (Appeal Br. at 10.) Thus, claims 8 and 9 fall with claim 1 and claims 12 and 17 fall with claim 11.

Regarding the obviousness of claim 18, the appellants argue that the claim is "patentable for the same reasons set forth above in connection with claim 1." (Appeal Br. at 21.) As aforementioned regarding claims 1 and 11, we do not find these reasons persuasive. In addition, the appellants make the following argument.

[C]laim 18 is also patentable because the method for converting a source program to an object code is limited to the steps of identifying from either compiler directive or syntax at a selected point in said first intermediate representation of the source program a possible asynchronous activity, inserting a pseudo operation responsive to identifying the possible asynchronous activity for a selected variable at the selected point in said first intermediate representation of the source program. (Id.)

In response, the examiner notes, "Cordy teaches identifying either compiler directive or syntax in the source program indicating said asynchronous activity can occur" (page 760, second paragraph) shows a '**bind var z to v**' statement indicative to the compiler that an asynchronous activity or call to procedure P can occur." (Examiner's Answer at 12.)

Giving claim 18 its broadest reasonable interpretation, we find that the claimed invention does not define over the references. The claim specifies in pertinent part "identifying from either compiler directive or syntax at a selected point in said first intermediate representation of the source program a possible asynchronous activity; inserting a pseudo operation responsive to identifying said possible asynchronous activity for a selected variable at said selected point in said first intermediate representation of the source program" In short, the claim recites using a compiler directive or syntax to identify a point of possible asynchronous activity in an intermediate representation of a source program and inserting a pseudo operation at that point. Because the claim employs a disjunctive connector, viz., "or," it reads on prior art that specifies a compiler directive or syntax. Prior art need not specify both a compiler directive and syntax.

As aforementioned regarding claims 1 and 11, Cordy discloses identifying the bind statement "**bind (var x to a(i), var y to a(j)),**" and inserting the legality assertion "**assert**

(*i not = j*)" preceding the bind. P. 765. The bind statement corresponds to a compiler directive or syntax. When the teachings of the references are combined, the result is the insertion of a pseudo operation in an intermediate representation of a source program at a point of possible asynchronous activity identified using a compiler directive or syntax. Therefore, we find that the references would have suggested the elements of claim 18. Accordingly, we affirm the rejection of claims 1, 8, 9, 11, 12, 17, and 18 under 35 U.S.C. § 103. Next, we consider the obviousness of claims 2, 4-7, and 13-16.

Obviousness of Claims 2, 4-7, and 13-16

We recall that in rejecting claims under 35 U.S.C. § 103, the patent examiner bears the initial burden of establishing a prima facie case of obviousness. A prima facie case is established when the teachings from the prior art itself would appear to have suggested the claimed subject matter to a person of ordinary skill in the art. If the examiner fails to establish a prima facie case, an obviousness rejection is

improper and will be overturned. In re Rijckaert, 9 F.3d 1531, 1532, 28 USPQ2d 1955, 1956 (Fed. Cir. 1993).

Regarding the obviousness of claim 2, the appellants argue, “[n]either Pyster or [sic] Cordy disclose [sic] or suggest [sic] any such steps for inserting a pseudo operation” (Appeal Br. at 16-17.) The argument also pertains to the obviousness of claims 13 and 14. In response, the examiner opines, “Cordy teaches a pseudo store instruction for selected variables at a selected point (e.g [sic] the **assert** (z = 1).” (Examiner’s Answer at 12.) He further opines, “Cordy teaches defining a pseudo reference instruction for selected variables (the variable v is a pseudo reference to z). (Id.)

We cannot find that Pyster and Cordy teach or would have suggested the last two steps of claim 2, the last step of claim 13, or the last step of claim 14. Claim 2 recites in pertinent part “generating a pseudo store instruction for selected variables at said selected point in said first

intermediate representation of the source program; and defining a pseudo reference instruction for selected variables at said selected point in said first intermediate representation of the source program." In short, the claim specifies two types of pseudo operations, viz., a pseudo store instruction and a pseudo reference instruction.

Similar to claim 2, claim 13 specifies in pertinent part "means for generating a pseudo store instruction for a selected variable at said selected point in said first intermediate representation of the source program." Also similar to claim 2, claim 14 specifies in pertinent part "means for defining a pseudo reference instruction for a selected variable at said selected point in said first intermediate representation of the source program." In short, claims 13 and 14 specify a pseudo store instruction and a pseudo reference instruction, respectively.

The examiner admits, "Pyster does not teach inserting a pseudo operation," (Final Rejection at 3), of any sort. As aforementioned regarding claims 1 and 11, Cordy discloses

inserting a legality assertion. An assertion is a "Boolean statement in a program that tests a condition that should, if the program is operating correctly, evaluate as true."

Microsoft Press Dictionary 28 (1994). It is neither a store instruction nor a reference instruction. The examiner's opinion that the variable *v* is a pseudo reference to *z*, (Examiner's Answer at 12), in the bind statement **bind var z to v** on page 760 of Cordy is irrelevant. Because the bind statement is not a legality assertion, it cannot be a pseudo operation of any sort including a pseudo reference instruction.

For the foregoing reasons, the examiner failed to show that Pyster and Cordy teach or would have suggested the last two steps of claim 2 and its dependent claims 4-7, the last step of claim 13 and its dependent claim 15, or the last step of claim 14 and its dependent claim 16. Accordingly, we find that the examiner's rejection of these claims does not amount to a prima facie case of obviousness. Because the examiner has not established a prima facie case, the rejection of

claims 2, 4-7, and 13-16 over Pyster in view of Cordy is improper. Therefore, we reverse the rejection of the claims under 35 U.S.C. § 103.

We end our consideration of the obviousness of the claims by concluding we are not required to raise or consider any issues not argued by the appellants. Our reviewing court stated, "[i]t is not the function of this court to examine the claims in greater detail than argued by an appellant, looking for nonobvious distinctions over the prior art." In re Baxter Travenol Labs., 952 F.2d 388, 391, 21 USPQ2d 1281, 1285 (Fed. Cir. 1991).

37 C.F.R. § 1.192(a), as amended at 60 Fed. Reg. 14518 (Mar. 17, 1995), was controlling when the appeal brief was filed. Section 1.192(a) stated as follows.

The brief . . . must set forth the authorities and arguments on which the appellant will rely to maintain the appeal. Any arguments or authorities not included in the brief will be refused consideration by the Board of Patent Appeals and Interferences, unless good cause is shown.

Also at the time of the brief, 37 C.F.R. § 1.192(c)(8)(iv) stated as follows.

For each rejection under 35 U.S.C. 103, the argument shall specify the errors in the rejection and, if appropriate, the specific limitations in the rejected claims which are not described in the prior art relied on in the rejection, and shall explain how such limitations render the claimed subject matter unobvious over the prior art. If the rejection is based upon a combination of references, the argument shall explain why the references, taken as a whole, do not suggest the claimed subject matter, and shall include, as may be appropriate, an explanation of why features disclosed in one reference may not properly be combined with features disclosed in another reference. A general argument that all the limitations are not described in a single reference does not satisfy the requirements of this paragraph.

In summary, section 1.192 provides that just as the court is not under any burden to raise or consider issues not argued by the appellant, the Board of Patent Appeals and Interferences is also not under any such burden.

CONCLUSION

To summarize, the decision of the examiner to reject claims 1, 8, 9, 11, 12, 17, and 18 under 35 U.S.C. § 103 is

affirmed. His decision to reject claims 2, 4-7, and 13-16
under § 103 is reversed.

No period for taking subsequent action concerning this appeal may be extended under 37 C.F.R. § 1.136(a).

AFFIRMED-IN-PART

ERROL A. KRASS)	
Administrative Patent Judge)	
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)	BOARD OF PATENT
MICHAEL R. FLEMING)	APPEALS
Administrative Patent Judge)	AND
)	INTERFERENCES
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