The Scheme of Things:

Standardization at Snowbird

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About fifty Schemers came a day early for the 1988 ACM Conference on Lisp and Functional Programming, which was held in late July at Snowbird, Utah. They devoted the Sunday before the conference to revising once again the *Revised³ Report on the Algorithmic Language Scheme* [1], or R3RS for short. Three days later, after the conference, the IEEE/MSC/P1178 Working Group on Scheme met for the first time. A two-day meeting of ISO/IEC JTC1/SC22 WG-16 that followed made it a good week for alphabet soup.

The day-long meeting to revise the R3RS had no formal name, but was usually called the "authors' meeting". Chair Hal Abelson kept things moving along through an agenda prepared by Jonathan Rees from issues raised by electronic mail. As at previous authors' meetings, all changes required unanimous consent. Of the changes that were adopted, the most important were to add a macro facility based on syntactic closures [2] and to change the syntax of numeric constants.

The four-hour meeting of the IEEE working group on Scheme, P1178, went very smoothly. As chair, Chris Haynes reported on the project approval for P1178 and explained the IEEE standardization process. David Bartley, Chris Hanson, and Jim Miller were elected to draft and edit the standard. Possible differences between the draft standard and the forthcoming *Revised⁴ Report on the Algorithmic Language Scheme* were discussed. The committee decided that a draft standard should be ready for review in February of 1989, and it was thought that P1178 could approve a draft standard for submission to the IEEE's Microprocessor Standards Committee (MSC) in the summer of 1989. As I write this, the next meeting of P1178 is being scheduled. The unapproved minutes of the first meeting appear later in this article.

As the American representative to ISO/IEC JTC1/SC22 WG-16, Dick Gabriel represents the Scheme community as well as Common Lisp. Chris Haynes also attended the WG-16 meeting at Snowbird as an observer.

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Most of the changes to R3RS approved by the authors' meeting simply correct or clarify that report. The single most significant decision was to entrust a subcommittee with the task of designing a macro facility based on syntactic closures but with a syntax resembling that of extend-syntax without the with feature [3]. The work of this subcommittee, comprised of Alan Bawden, Kent Dybvig, Bob Hieb, and Jonathan Rees, has been pre-approved. That is, whatever the subcommittee comes up with will go into the R4RS as an inessential feature provided it can deliver something reasonable in time, where reasonableness is presumably a concept to be negotiated between the subcommittee and the R4RS editors.

Everyone seems to want macros, and the subcommittee arrangement shows that impatience is winning out over partisanship. Syntactic closures appear sound, but they need to be combined with a convenient language for defining macros such as is provided by extend-syntax. The Scheme community has accumulated a fair amount of experience with extend-syntax, and it is expected (hoped?) that any bugs that might eventually be found in the subcommittee's proposal can be fixed without requiring major changes in the defining language.

Next to macros, the most significant change was to simplify the syntax of numeric constants, incidentally making real constants look more like those of Common Lisp [4]. The exactness and radix prefixes will precede the sign (as in #i#x-a/b), exponents will not be allowed with the rational syntax or when the radix is not decimal, and the precision prefix will be replaced by the exponent markers used in Common Lisp. The syntax of complex constants will be liberalized to allow constants like +i, -i, +4.7i, and -4/5i.

A numeric constant will be considered exact unless it contains an explicit inexactness prefix #i or contains one of the following in the absence of an explicit exactness prefix: imprecise digits, as in 34##; an explicit decimal point, as in 5.; an exponent marker, as in 1e6; or an at-sign indicating polar notation, as in 5.0@1.5707963267948966. The discussion of exactness will be improved in R4RS.

Many syntaxes and procedures that were inessential in R3RS will be essential in R4RS.

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IEEE/MSC/P1178 Working Group on Scheme

Unapproved Minutes of Meeting

27 July 1988
Snowbird, Utah

The meeting was called to order by Chris Haynes at approximately 1:30 pm.

Attendees: Norman Adams, Cyril N. Alberga, Joel Bartlett, David H. Bartley, William Clinger, Jeffrey Dalton, Olivier Danvy, Kenneth Dickey, Daniel P. Friedman, Mark Friedman, Richard P. Gabriel, Patrick Greussay, Chris Hanson, Christopher Haynes, Takayasu Ito, Paul Kristoff, Sidney Marshall, Robert Mathis, Jim Miller, Andy Norman, Eric Ost, John D. Ramsdell, Jonathan Rees, Guillermo Rozas, George Springer, Guy L. Steele Jr., Eric Tiedemann, Mitchell Wand, Jon L. White, Taiichi Yuasa.

1. Introductions.

2. Approval of agenda.

The printed agenda was approved with three additions:

  3.5 Report on Scheme Report workshop

  4.5 Time schedule

    macros added to agenda item 7

3. Introductory remarks by the chair, Chris Haynes.

Report on the Scheme Standardization Study Group meeting of 25 March 1988.

The following main entries in the the Standards Project Authorization (PAR) for this Working Group (WG) were read:

  Project Title: SCHEME PROGRAMMING LANGUAGE STANDARD

  Scope of Proposed Standard: Scheme is a member of a "LISP family" of languages (as are

Common Lisp. Lisp 1.5 and others) in the same sense that Pascal is a member of an "Algol family" of languages (as re Algol-60 and Ada). As such, Scheme is a distinct and separate language from Common Lisp. Within this context, a standard for Scheme will be derived from the "Report on the Algorithmic Language Scheme" published by MIT.

Purpose of Proposed Standard: To provide a standard reflecting the current consensus on the definition and specification of the programming language Scheme.

Sponsor Technical Committee: TCMM, Society: Computer.

Proposed Coordination and Method of Coordination: X3J13: common membership; TCCL: circulation of drafts to TCCL Stds Director; ACM: circulation of drafts to Stds Director; SCC20: Circulation of drafts to chairman

Name of Group that will write the Standard: The Working Group on Scheme.

Person Delegated to Receive Communications and Conduct Liaison with Interested Bodies: Prof. Christopher T. Haynes, Computer Science Department, Indiana University, Blooming-ton, IN 47405, 812/335-6486.

Submitted by: Dr. Michael Smolin, TCMM Stds Director.

Overview of the IEEE standardization process. Main points: IEEE standards are routinely for-warded to ANSI for consideration as ANSI standards. The IEEE provides for Trial Use Standards. IEEE owns standards and drafts. The IEEE Standards Board has assured us there is no conflict between an IEEE standard based on the R*RS and the public status of the R*RS. Mike Smolin's articles in *IEEE Micro*, August and October, 1987, provide an overview of IEEE standardization procedures. Only the WG chair must belong to the IEEE. WG meetings are open to all interested parties. The balloting body is determined by the TCMM. IEEE members (and others on occasion) can request membership in this body. A 75% response and 75% approval rate is required. Neg-ative votes must be accompanied by explanations, which the WG must respond to. REVCOM reviews unresolved negative votes, and if an unacceptable number remain, the standard may not be approved or may be approved for Trial Use. A Trail Use Standard may also be requested by the WG. The balloting body must be balanced, with members divided among categories such as producer/user/general-interst or producer/user/academic. Trial Use Standards expire after 2 years. After 5 years, Full Use Standards must be reaffirmed, revised, or withdraw. The forward and appendixes of IEEE standards may not contain binding material.

Registration fees are a possibility at future meetings.

Communication between meetings: minutes, proposed agendas, standard drafts, etc, will be mailed to those present at the meeting and other interested parties. [See motion on electronic news group under item 5.]

3.5 Report on Scheme Report Workshop of July 24th by Will Clinger. Proposed differences between R3RS and the forthcoming R4RS were reviewed.

4. Scope and purpose of the Working Group.

Hal's manifesto was summarized:

1. The Scheme standard should encourage evolution of the language, including alternate pro-gramming styles.

2. The standard is incomplete, so implementations are expected to extended the standard.

3. Early standardization of features should be avoided, so that research on improved features is not curtailed.

Moved and seconded: that some statement of scope & purpose be drafted by the editors. Discussion: Jon L. White observed that Hal's manifesto listed non-purposes, and suggested that portability of programs was a purpose. In response to a statement that the standard should encourage alternative programming styles, Jon White suggested that the standard should not encourage COBOL style. Someone urged that language from the PAR relating the standard to the R*RS should be included. Taking these three points as amendments, the motion as amended passed unanimously.

4.5 Time schedule.

After some discussion, this item was moved to the end of the agenda.

5. Election of editors to draft the Trial Standard.

David Bartley, Chris Hanson, and Jim Miller were elected to edit the standard.

6. Time, place, and local arrangements for next meeting.

After some discussion, this item was moved to the end of the agenda.

7. General discussion of differences between the Scheme standard and the R4RS.

Sense of discussion: It is appropriate to say of certain extensions that if they are provided they must be of a given kind; e.g. macros.

Should a macro mechanism be in the standard? Sense of discussion: No decision now; not in first draft in any case. A non-binding appendix on macros is one possibility.

Optional features. Sense of discussion: Only features that are essential in some R*RS should be essential in the standard. Moved by Jim Miller, seconded, and amended to this statement: All R4RS special forms except delay and macros should be incorporated in the first draft as mandatory features. The motion as amended passed, with two opposed. At issue were one-armed if, let*, do, named let, and internal define, which will not be essential in R4RS but will be mandatory in the first draft of the standard. The name of named let may change in the R4RS, in which case it will change in the first draft of the standard.

Should optional features appear in the body of the standard or in an appendix? Numbers are the issue. Should there be an integer Scheme, a real Scheme, and a complex Scheme? Moved, seconded, and approved by acclamation: Number material should be included in the body of the standard as in R4RS.

Moved, seconded, and approved by acclamation: The status of the remaining inessential material is to be decided by the editors.

Moved, seconded, and approved by acclamation: The formal semantics should be in an appendix.

Discussion of number->string, string->number. Left to editors.

Discussion of call-with-current-continuation. Sense of discussion: leave it in as a mandatory procedure.

Moved, seconded, and approved by acclamation: load, transcript-on, transcript-off should be relegated to an appendix.

Moved, seconded, and approved by acclamation: Lambda notation should stay as in R4RS.

Moved, seconded, and so obviously an unnecessary motion that it was never voted upon: The editors may recommend dropping even essential procedures.

Moved, seconded, and approved by acclamation: Chris Hanson will form an electronic news group at MIT for technical and administrative communication of the WG. [Transcripts of activity in this group will be periodically mailed to interested parties, upon request to the chair, for the benefit of those without network connections.]

6. Time, place, and local arrangements for next meeting [had been deferred].

The Principles of Programming Languages conference in January and Cambridge in February were the most likely. Cambridge seemed better than POPL. The chair will propose date, time, and place of next meeting.

4.5 Time schedule [had been deferred].

Moved, seconded and approved: The WG anticipates the following time schedule: 6 months—review of first draft of standard; 12 months—send approved draft of standard to MSC.

The meeting adjourned at approximately 5:30 pm.

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[1] Jonathan Rees and William Clinger [editors]. Revised[3] Report on the Algorithmic Language Scheme. *SIGPLAN Notices* 21, 12, December 1986, 37–79.

[2] Alan Bawden and Jonathan Rees. Syntactic Closures. *Proceedings of the 1988 ACM Conference on Lisp and Functional Programming*, July 1988, 86–95.

[3] Kent Dybvig. *The Scheme Programming Language*. Prentice Hall, 1987.

[4] Guy L Steele Jr. *Common Lisp: The Language*. Digital Press, 1984.