Title: UNIPROCESSOR SCHEDULABILITY TESTING AND SCHEDULER FOR NON-PREEMPTIVE TASK SETS

Abstract: A method of determining schedulability of tasks for uniprocessor execution includes defining a well-formed, non-preemptive task set having a plurality of tasks, each task having at least one subtask. A determination of whether the task set is schedulable is made, such that a near-optimal amount of temporal resources required to execute the task set is estimated. Further, a method of determining schedulability of a subtask for uniprocessor execution includes defining a well-formed, non-preemptive task set having a plurality of tasks, each task having at least one subtask. A determination of whether a subtask in the task set is schedulable at a specific time is made in polynomial time. Systems for implementing such methods are also provided.
Published:

— with international search report (Art. 21(3))
— before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))

Date of publication of the international search report: 16 October 2014
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

G06F 9/48

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category* Citation of document, with indication, where appropriate, of the relevant passages Relevant to claim No.


abstract page 3, left-hand column, line 1 - page 4, left-hand column, line 2 page 8, left-hand column, line 30 - line 6 ----- 

9, 18, 23, 25, 26, 31, 33, 34

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or on a date otherwise special reason (as specified)

"O" document referred to in the context of the invention

"P" late document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"Q" document member of the same patent family

Date of the actual completion of the international search

18 July 2014

Date of mailing of the international search report

20/08/2014

Name and mailing address of the ISA

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INTERNATIONAL SEARCH REPORT

Box No. II  Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. [ ] Claims Nos.: because they relate to subject matter not required to be searched by this Authority, namely:

2. [X] Claims Nos.: because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
   see FURTHER INFORMATION sheet PCT/ISA/210

3. [ ] Claims Nos.: because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III  Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. [ ] As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. [ ] As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.

3. [ ] As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. [ ] No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

[ ] The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

[ ] The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

[ ] No protest accompanied the payment of additional search fees.

Form PCT/ISA/21 0 (continuation of first sheet (2)) (April 2005)
Continuation of Box II.2

Claims Nos.: 1-8, 10-17, 19-22, 24, 27-30, 32 (completely); 9, 18, 23, 25, 26, 31, 33, 34 (partially)

The application does not satisfy the requirements of Article 6 PCT because claims 1-8, 10-17, 19-22, 24, 27-30 and 32 are defined as a result to be achieved.

Of these claims, claims 7, 8, 16, 17, 19 and 27 are concerned with determining whether a given task set is schedulable. But instead of specifying how this is done, these claims merely specify that the test is accomplished in polynomial time.

Claims 1 and 10 also regard a schedulability test. These claims require estimating a "near optimal" amount of time required for task execution, which is again merely a design datum.

Claims 2-6, 11-15, 20-22, 24, 28-30 and 32 only specify the type of tasks for which the schedulability (feasibility) test is to be carried out. Hence these claims, too, do not contribute to any constructive method or algorithm showing how the desired result could be achieved.

Claims 1-8, 10-17, 19-22, 24, 27-30 and 32 are unclear to such an extent that they could not be searched. The applicant is referred to Article 17 (2) (a) (ii) and 17 (2) (b) PCT; see also PCT guides, 9.19.

The remaining claims 9, 18, 23, 25, 26, 31, 33 and 34 seem to relate to a scheduling algorithm (as opposed to a schedulability test), claims 9, 18, 25, 26, 33 and 34 in very general terms.

Claims 23 and 31 allude to a particular part of the scheduling algorithm described in the description, termed the "Russian doll's test". This is described in paragraphs 150-160 of the description, along with figure 12. The "Russian doll's test" is considered as a scheduling algorithm according to figure 11, top line and line 12:

According to Article 15 (2) PCT, the claims govern the scope of the search. Hence the extent of this search is that of description on paragraphs 150-160 and figure 12, motivated by claims 23 and 31.

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EP policy when acting as an International Preliminary Examination Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the applicant proceeds into the regional phase
before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guidelines C-IV, 7.2), should the problems which led to the Article 17(2) declaration be overcome.
<table>
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<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
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