

Claims

[Claim 1]

A computer program product for enabling and disabling execution of a run-time instrumentation facility on a processor, the computer program product comprising:

a tangible storage medium readable by a processing circuit and storing instructions for execution by the processing circuit for performing a method comprising:

fetching, by a processor, an instruction for execution by the processor in a lesser privileged state, the instruction one of a run-time instrumentation facility off (RIOFF) instruction and a run-time instrumentation facility on (RION) instruction;

based on determining, by the processor, that the run-time instrumentation facility permits execution of the instruction in the lesser-privileged state and that controls associated with the run-time instrumentation facility are valid, executing the instruction, the executing comprising any one of:

disabling the run-time instrumentation facility based on the instruction being the RIOFF instruction, the disabling including updating a bit in a program status word (PSW) of the processor to indicate that run-time instrumentation data should not be captured by the processor; and
enabling the run-time instrumentation facility based on the instruction being the RION instruction, the enabling including updating the bit in the PSW to indicate that run-time instrumentation data should be captured by the processor.

[Claim 2]

The computer program product of claim 1, wherein the method further comprises:

fetching, by the processor, a run-time instrumentation control block (RICCB) that includes a problem state execution control bit previously set to a value by a program executing in a privileged state, wherein the determining that the run-time instrumentation facility permits execution of the instruction in the lesser-privileged state is based on the value of the problem state execution control bit.

[Claim 3]

The computer program product of claim 1, wherein the method further comprises:

fetching, by the processor, a run-time instrumentation control block (RICCB) that includes a validity bit previously set to a value by a program executing in a privileged state, wherein the determining that

controls associated with the run-time instrumentation facility are valid is based on the value of the validity bit.

[Claim 4]

The computer program product of claim 1, wherein the method further comprises:

based on the enabling:

capturing, by the processor, the run-time instrumentation data based on an instruction stream of instructions of an application program executing on the processor, the capturing comprising storing the run-time instrumentation data in a collection buffer of the processor; detecting, by the processor, a run-time instrumentation sample point trigger; and

copying contents of the collection buffer into a program buffer as a reporting group based on the detecting the run-time instrumentation sample point trigger, the program buffer located in main storage in an address space that is accessible by the application program.

[Claim 5]

The computer program product of claim 4, wherein the method further comprises capturing, in the collection buffer, instruction addresses and metadata corresponding to events detected during the executing of the instruction stream.

[Claim 6]

The computer program product of claim 4, wherein the reporting group includes a predetermined number of one or more instrumentation records comprising contents of the collection buffer and system information records.

[Claim 7]

The computer program product of claim 4, wherein the copying includes copying the reporting group into the program buffer starting at a current address of the program buffer, the program buffer stored at a program buffer origin address specified by an instruction accessible control block that also specifies an address of a last byte in the program buffer and the current address in the program buffer.

[Claim 8]

The computer program product of claim 1, wherein the method further comprises:

saving a remaining same interval count (RSIC) field based on the disabling;

fetching, by the processor, a RION instruction; and

restoring the RSIC field.

[Claim 9]

A method for enabling and disabling execution of a run-time instrumentation facility on a processor, the method comprising:

fetching, by a processor, an instruction for execution by the processor

in a lesser privileged state, the instruction one of a run-time instrumentation facility off (RIOFF) instruction and a run-time instrumentation facility on (RION) instruction;

based on determining, by the processor, that the run-time instrumentation facility permits execution of the instruction in the lesser-privileged state and that controls associated with the run-time instrumentation facility are valid, executing the instruction, the executing comprising any one of:

disabling the run-time instrumentation facility based on the instruction being the RIOFF instruction, the disabling including updating a bit in a program status word (PSW) of the processor to indicate that run-time instrumentation data should not be captured by the processor; and
enabling the run-time instrumentation facility based on the instruction being the RION instruction, the enabling including updating the bit in the PSW to indicate that run-time instrumentation data should be captured by the processor.

[Claim 10]

The method of claim 9, further comprising:

fetching, by the processor, a run-time instrumentation control block (RICCB) that includes a problem state execution control bit previously set to a value by a program executing in a privileged state, wherein the determining that the run-time instrumentation facility permits execution of the instruction in the lesser-privileged state is based on the value of the problem state execution control bit.

[Claim 11]

The method of claim 9, further comprising:

fetching, by the processor, a run-time instrumentation control block (RICCB) that includes a validity bit previously set to a value by a program executing in a privileged state, wherein the determining that controls associated with the run-time instrumentation facility are valid is based on the value of the validity bit.

[Claim 12]

The method of claim 9, further comprising, based on the enabling:

capturing, by the processor, the run-time instrumentation data based on an instruction stream of instructions of an application program executing on the processor, the capturing comprising storing the run-time instrumentation data in a collection buffer of the processor;
detecting, by the processor, a run-time instrumentation sample point trigger; and
copying contents of the collection buffer into a program buffer as a reporting group based on the detecting the run-time instrumentation

- sample point trigger, the program buffer located in main storage in an address space that is accessible by the application program.
- [Claim 13] The method of claim 12, further comprising capturing, in the collection buffer, instruction addresses and metadata corresponding to events detected during the executing of the instruction stream.
- [Claim 14] The method of claim 12, wherein the reporting group includes a predetermined number of one or more instrumentation records comprising contents of the collection buffer and system information records.
- [Claim 15] The method of claim 12, wherein the copying includes copying the reporting group into the program buffer starting at a current address of the program buffer, the program buffer stored at a program buffer origin address specified by an instruction accessible control block that also specifies an address of a last byte in the program buffer and the current address in the program buffer.
- [Claim 16] The method of claim 9, further comprising:
saving a remaining sample interval count (RSIC) field based on the disabling;
fetching, by the processor, a RION instruction; and
restoring the RSIC field.
- [Claim 17] A system for enabling and disabling execution of a run-time instrumentation facility on a processor, the system comprising:
a processor, the system configured to perform a method comprising:
fetching, by the processor, an instruction for execution by the processor in a lesser privileged state, the instruction one of a run-time instrumentation facility off (RIOFF) instruction and a run-time instrumentation facility on (RION) instruction;
based on determining, by the processor, that the run-time instrumentation facility permits execution of the instruction in the lesser-privileged state and that controls associated with the run-time instrumentation facility are valid, executing the instruction, the executing comprising any one of:
disabling the run-time instrumentation facility based on the instruction being the RIOFF instruction, the disabling including updating a bit in a program status word (PSW) of the processor to indicate that run-time instrumentation data should not be captured by the processor; and
enabling the run-time instrumentation facility based on the instruction being the RION instruction, the enabling including updating the bit in the PSW to indicate that run-time instrumentation data should be

captured by the processor.

[Claim 18]

The system of claim 17, wherein the method further comprises:
fetching, by the processor, a run-time instrumentation control block (RICCB) that includes a problem state execution control bit previously set to a value by a program executing in a privileged state, wherein the determining that the run-time instrumentation facility permits execution of the instruction in the lesser-privileged state is based on the value of the problem state execution control bit.

[Claim 19]

The system of claim 17, wherein the method further comprises:
fetching, by the processor, a run-time instrumentation control block (RICCB) that includes a validity bit previously set to a value by a program executing in a privileged state, wherein the determining that controls associated with the run-time instrumentation facility are valid is based on the value of the validity bit.

[Claim 20]

The system of claim 17, wherein the method further comprises:
based on the enabling:
capturing, by the processor, the run-time instrumentation data based on an instruction stream of instructions of an application program executing on the processor, the capturing comprising storing the run-time instrumentation data in a collection buffer of the processor;
detecting, by the processor, a run-time instrumentation sample point trigger; and
copying contents of the collection buffer into a program buffer as a reporting group based on the detecting the run-time instrumentation sample point trigger, the program buffer located in main storage in an address space that is accessible by the application program.

CLAIMS:

1. A computer program product for enabling and disabling execution of a run-time instrumentation facility on a processor, the computer program product comprising a non-transitory storage medium readable by a processing circuit and storing instructions for execution by the processing circuit for performing a method comprising:

fetching an instruction of a currently executing thread in a multi-threaded environment for execution by the processor in a first state, the instruction one of a run-time instrumentation facility off (RIOFF) instruction and a run-time instrumentation facility on (RION) instruction, the fetching by a processor;

based on determining, by the processor, that the run-time instrumentation facility permits execution of the instruction in the first state and that controls associated with the run-time instrumentation facility are valid, executing the instruction, the executing comprising any one of:

disabling the run-time instrumentation facility based on the instruction being the RIOFF instruction, the disabling including updating a run-time instrumentation facility state bit in a program status word (PSW) of the processor to indicate that run-time instrumentation data should not be captured by the processor; and

enabling the run-time instrumentation facility based on the instruction being the RION instruction, the enabling including updating the run-time instrumentation facility state bit in the PSW to indicate that run-time instrumentation data should be captured by the processor,

wherein the PSW is associated with the executing thread, and a state of the run-time instrumentation facility for the executing thread is maintained in the PSW across dispatches of the executing thread.

2. The computer program product of claim 1, wherein the method further comprises: fetching, by the processor, a run-time instrumentation control block (RICCB) that includes a problem state execution control bit previously set to a value by a program executing in a privileged state, wherein the determining that the run-time instrumentation facility permits execution of the instruction in the first state is based on the value of the problem state execution control bit, wherein the first state is different than the privileged state.

3. The computer program product of claim 1, wherein the method further comprises:

fetching, by the processor, a run-time instrumentation control block (RICCB) that includes a validity bit previously set to a value by a program executing in a privileged state, wherein the determining that controls associated with the run-time instrumentation facility are valid is based on the value of the validity bit.

4. The computer program product of claim 1, wherein the method further comprises:
 - based on the enabling:
 - capturing, by the processor, the run-time instrumentation data based on an instruction stream of instructions of an application program executing on the processor, the capturing comprising storing the run-time instrumentation data in a collection buffer of the processor;
 - detecting, by the processor, a run-time instrumentation sample point trigger; and
 - copying contents of the collection buffer into a program buffer as a reporting group based on the detecting the run-time instrumentation sample point trigger, the program buffer located in main storage in an address space that is accessible by the application program.
5. The computer program product of claim 4, wherein the method further comprises capturing, in the collection buffer, instruction addresses and metadata corresponding to events detected during the executing of the instruction stream.
6. The computer program product of claim 4, wherein the reporting group includes a predetermined number of one or more instrumentation records comprising contents of the collection buffer and system information records.
7. The computer program product of claim 4, wherein the copying includes copying the reporting group into the program buffer starting at a current address of the program buffer, the program buffer stored at a program buffer origin address specified by an instruction accessible control block that also specifies an address of a last byte in the program buffer and the current address in the program buffer.
8. The computer program product of claim 1, wherein the method further comprises:
 - saving a remaining same interval count (RSIC) field based on the disabling; fetching, by the

processor, a RION instruction; and restoring the RSIC field.

9. A system for enabling and disabling execution of a run-time instrumentation facility on a hardware computer processor, the system comprising a hardware computer processor, the system configured to perform a method comprising:

fetching an instruction of a currently executing thread in a multi-threaded environment for execution by the processor in a first state, the instruction one of a run-time instrumentation facility off (RIOFF) instruction and a run-time instrumentation facility on (RION) instruction, the fetching by a processor;

based on determining, by the processor, that the run-time instrumentation facility permits execution of the instruction in the first state and that controls associated with the run-time instrumentation facility are valid, executing the instruction, the executing comprising any one of:

disabling the run-time instrumentation facility based on the instruction being the RIOFF instruction, the disabling including updating a run-time instrumentation facility state bit in a program status word (PSW) of the processor to indicate that run-time instrumentation data should not be captured by the processor; and

enabling the run-time instrumentation facility based on the instruction being the RION instruction, the enabling including updating the run-time instrumentation facility state bit in the PSW to indicate that run-time instrumentation data should be captured by the processor,

wherein the PSW is associated with the executing thread, and a state of the run-time instrumentation facility for the executing thread is maintained in the PSW across dispatches of the executing thread.

10. The system of claim 9, wherein the method further comprises:

fetching, by the processor, a run-time instrumentation control block (RICCB) that includes a problem state execution control bit previously set to a value by a program executing in a privileged state, wherein the determining that the run-time instrumentation facility permits execution of the instruction in the first state is based on the value of the problem state execution control bit, wherein the first state is different than the privileged state.

11. The system of claim 9, wherein the method further comprises:

fetching, by the processor, a run-time instrumentation control block (RICCB) that includes a validity bit previously set to a value by a program executing in a privileged state, wherein the determining that controls associated with the run-time instrumentation facility are valid is based on the value of the validity bit.

12. The system of claim 9, wherein the method further comprises:

based on the enabling:

capturing, by the processor, the run-time instrumentation data based on an instruction stream of instructions of an application program executing on the processor, the capturing comprising storing the run-time instrumentation data in a collection buffer of the processor;

detecting, by the processor, a run-time instrumentation sample point trigger;

and

copying contents of the collection buffer into a program buffer as a reporting group based on the detecting the run-time instrumentation sample point trigger, the program buffer located in main storage in an address space that is accessible by the application program.

13. A method for enabling and disabling execution of a run-time instrumentation facility on a processor, the method comprising:

fetching, by a processor, an instruction of a currently executing thread in a multi-threaded environment for execution by the processor in a first state, the instruction one of a run-time instrumentation facility off (RIOFF) instruction and a run-time instrumentation facility on (RION) instruction;

based on determining, by the processor, that the run-time instrumentation facility permits execution of the instruction in the first state and that controls associated with the run-time instrumentation facility are valid, executing the instruction, the executing comprising any one of:

disabling the run-time instrumentation facility based on the instruction being the RIOFF instruction, the disabling including updating a run-time instrumentation facility state bit in a program status word (PSW) of the processor to indicate that run-time instrumentation data should not be captured by the processor; and

enabling the run-time instrumentation facility based on the instruction being the RION instruction, the enabling including updating the run-time instrumentation facility

state bit in the PSW to indicate that run-time instrumentation data should be captured by the processor,

wherein the PSW is associated with the executing thread, and a state of the run-time instrumentation facility for the executing thread is maintained in the PSW across dispatches of the executing thread.

14. The method of claim 13, further comprising:

fetching, by the processor, a run-time instrumentation control block (RICCB) that includes a problem state execution control bit previously set to a value by a program executing in a privileged state, wherein the determining that the run-time instrumentation facility permits execution of the instruction in the first state is based on the value of the problem state execution control bit, wherein the first state is different than the privilege state.

15. The method of claim 13, further comprising:

fetching, by the processor, a run-time instrumentation control block (RICCB) that includes a validity bit previously set to a value by a program executing in a privileged state, wherein the determining that controls associated with the run-time instrumentation facility are valid is based on the value of the validity bit.

16. The method of claim 13, further comprising,
based on the enabling:

capturing, by the processor, the run-time instrumentation data based on an instruction stream of instructions of an application program executing on the processor, the capturing comprising storing the run-time instrumentation data in a collection buffer of the processor;

detecting, by the processor, a run-time instrumentation sample point trigger;
and

copying contents of the collection buffer into a program buffer as a reporting group based on the detecting the run-time instrumentation sample point trigger, the program buffer located in main storage in an address space that is accessible by the application program.

17. The method of claim 16, further comprising:

capturing, in the collection buffer, instruction addresses and metadata corresponding to events detected during the executing of the instruction stream.

18. The method of claim 16, wherein the reporting group includes a predetermined number of one or more instrumentation records comprising contents of the collection buffer and system information records.

19. The method of claim 16, wherein the copying includes copying the reporting group into the program buffer starting at a current address of the program buffer, the program buffer stored at a program buffer origin address specified by an instruction accessible control block that also specifies an address of a last byte in the program buffer and the current address in the program buffer.

20. The method of claim 13, further comprising:
saving a remaining sample interval count (RSIC) field based on the disabling;
fetching, by the processor, a RION instruction; and restoring the RSIC field.