

Caution on clearing interrupt flags

Questions:

The issue of caution on clearing interrupt flags

Answer:

Direct memory access can be used to improve the efficiency of code execution. But when it is utilized in interrupt flag clear operation, it is likely that an interrupt function is abnormally performed twice in the case of the improper clear timing.

Take an EXINT interrupt as an example, it is proceeded as follows:

- 1) The desired edge is detected on an IO pin
- 2) The Line flag is set in the interrupt status register (EXINT_INTSTS)
- 3) NVIC flag is set
- 4) Jump to execute the interrupt function
- 5) NVIC flag is then cleared immediately
- 6) Clear Line flag and interrupt the code execution
- 7) Exit the interrupt

After a clear flag command is executed, it usually takes two cycles (depending on peripherals, a slight difference may exist) for the flag to be really cleared.

If “Line flag clear” command is written at the end of an interrupt function during the application design, then the execution of a flag clear command would cause an immediate exit from the interrupt function. At this point, there is a possibility that the application code has left the interrupt function but the Line flag remain active because of not being cleared in time. This would cause a repetition operation starting from step 2, so that the interrupt is exceptionally executed once more.

Example: Flag clear command is put at the end of an interrupt (potential risk may exist)

```
void EXINT0_IRQHandler(void)
{
    /*
    user code
    */
    EXINT->intsts = EXINT_LINE_0;
}
```

Example: Flag clear code command is placed properly

```
void EXINT0_IRQHandler(void)
{
    EXINT->intsts = EXINT_LINE_0;
    /*
    user code
    */
}
```

Of course, the above-mentioned issue would not happen if a library function is called by the application to clear a flag. The reason is that the time required to jump to a command can be enough to clear a flag.

Type: MCU applications

Applicable products: All AT32 series

Main function: Interrupt flag clear

Minor function: None

Document revision history

Date	Revision	Changes
2022.2.28	2.0.0	Initial release

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