Kernel driver emc1403

Supported chips:

- SMSC / Microchip EMC1402, EMC1412

  Addresses scanned: I2C 0x18, 0x1c, 0x29, 0x4c, 0x4d, 0x5c

  Prefix: 'emc1402'

  Datasheets:

  - http://ww1.microchip.com/downloads/en/DeviceDoc/1412.pdf
  - https://ww1.microchip.com/downloads/en/DeviceDoc/1402.pdf

- SMSC / Microchip EMC1403, EMC1404, EMC1413, EMC1414

  Addresses scanned: I2C 0x18, 0x29, 0x4c, 0x4d

  Prefix: 'emc1403', 'emc1404'

  Datasheets:

  - http://ww1.microchip.com/downloads/en/DeviceDoc/1403_1404.pdf
  - http://ww1.microchip.com/downloads/en/DeviceDoc/1413_1414.pdf

- SMSC / Microchip EMC1422

  Addresses scanned: I2C 0x4c

  Prefix: 'emc1422'

  Datasheet:

  - https://ww1.microchip.com/downloads/en/DeviceDoc/1422.pdf

- SMSC / Microchip EMC1423, EMC1424

  Addresses scanned: I2C 0x4c

  Prefix: 'emc1423', 'emc1424'

  Datasheet:

  - https://ww1.microchip.com/downloads/en/DeviceDoc/1423_1424.pdf

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Description

The Standard Microsystems Corporation (SMSC) / Microchip EMC14xx chips contain up to four temperature sensors. EMC14x2 support two sensors (one internal, one external). EMC14x3 support three sensors (one internal, two external), and EMC14x4 support four sensors (one internal, three external).

The chips implement three limits for each sensor: low (tempX_min), high (tempX_max) and critical (tempX_crit.) The chips also implement an hysteresis mechanism which applies to all limits. The relative difference is stored in a single register on the chip, which means that the relative difference between the limit and its hysteresis is always the same for all three limits.

This implementation detail implies the following:

- When setting a limit, its hysteresis will automatically follow, the difference staying unchanged. For example, if the old critical limit was 80 degrees C, and the hysteresis was 75 degrees C, and you change the critical limit to 90 degrees C, then the hysteresis will automatically change to 85 degrees C.
- The hysteresis values can't be set independently. We decided to make only temp1_crit_hyst writable, while all other hysteresis attributes are read-only. Setting temp1_crit_hyst writes the difference between temp1_crit_hyst and temp1_crit into the chip, and the same relative hysteresis applies automatically to all other limits.
- The limits should be set before the hysteresis.