

# ::: Serial Interfacing

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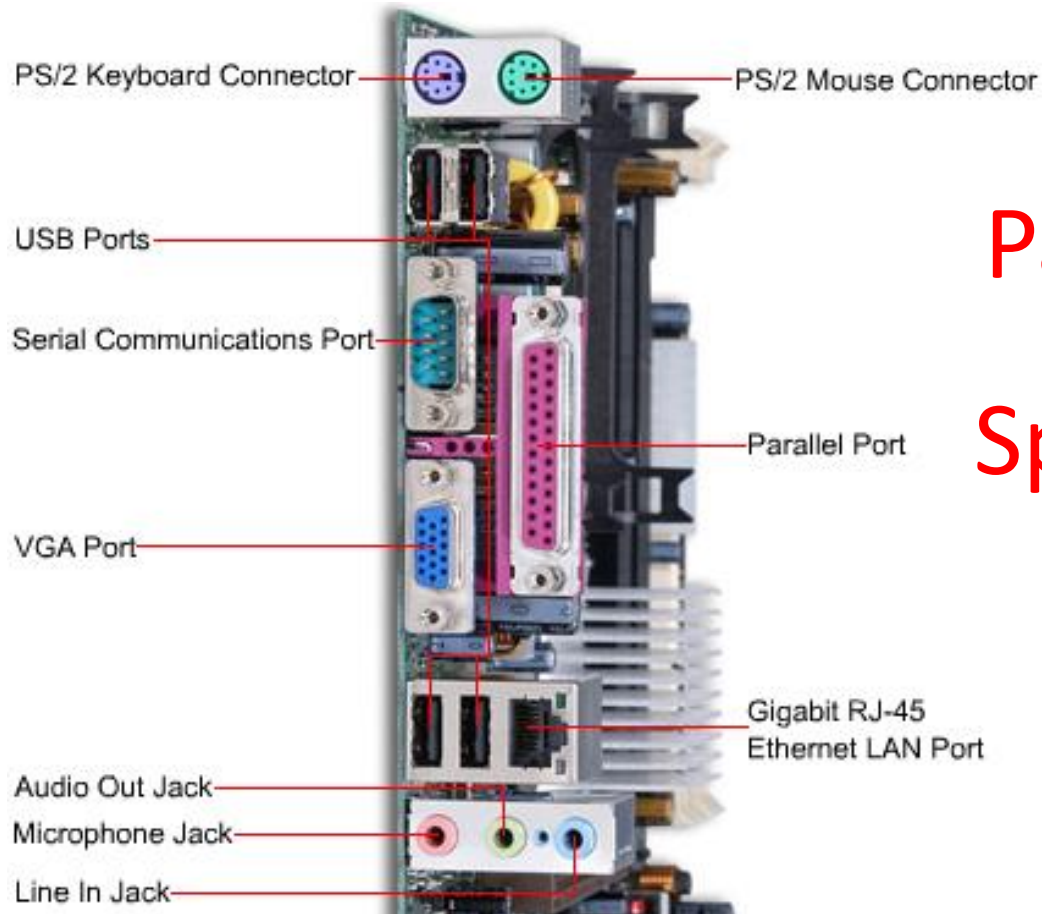
# Overview

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- Mengapa serial?
- Kapan komunikasi serial digunakan?
- Persyaratan apa yang diperlukan?
- Jenis-jenis komunikasi serial?
- Bagaimana protokol komunikasi?
- Bagaimana manajemen komunikasi serial?

# Problem???

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**Parallel** Vs **Serial**  
**Speed** Vs **Effective**

# Antarmuka Serial Standar

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Jenis komunikasi serial berdasarkan karakteristiknya

- RS-232
- I<sup>2</sup>C
- SPI
- SATA
- USB
- RS-485
- CAN
- One-wire

# RS-232 Specification (LEVEL)

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- **TRANSMITTED SIGNAL VOLTAGE**

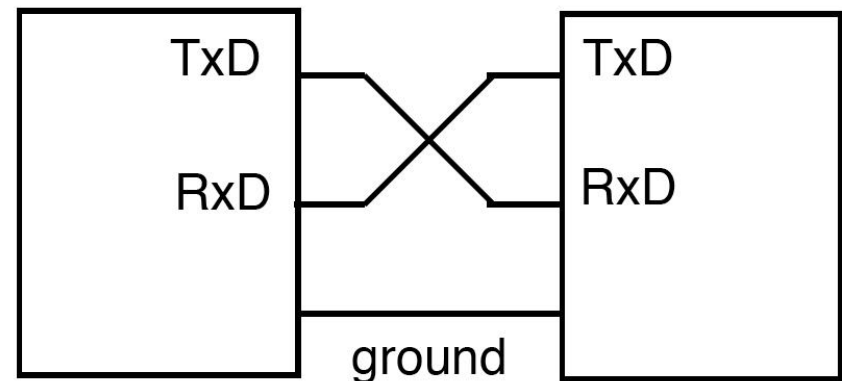
binari 0 : +5 to +15 Vdc (space)

binari 1 : -5 to -15 Vdc (mark)

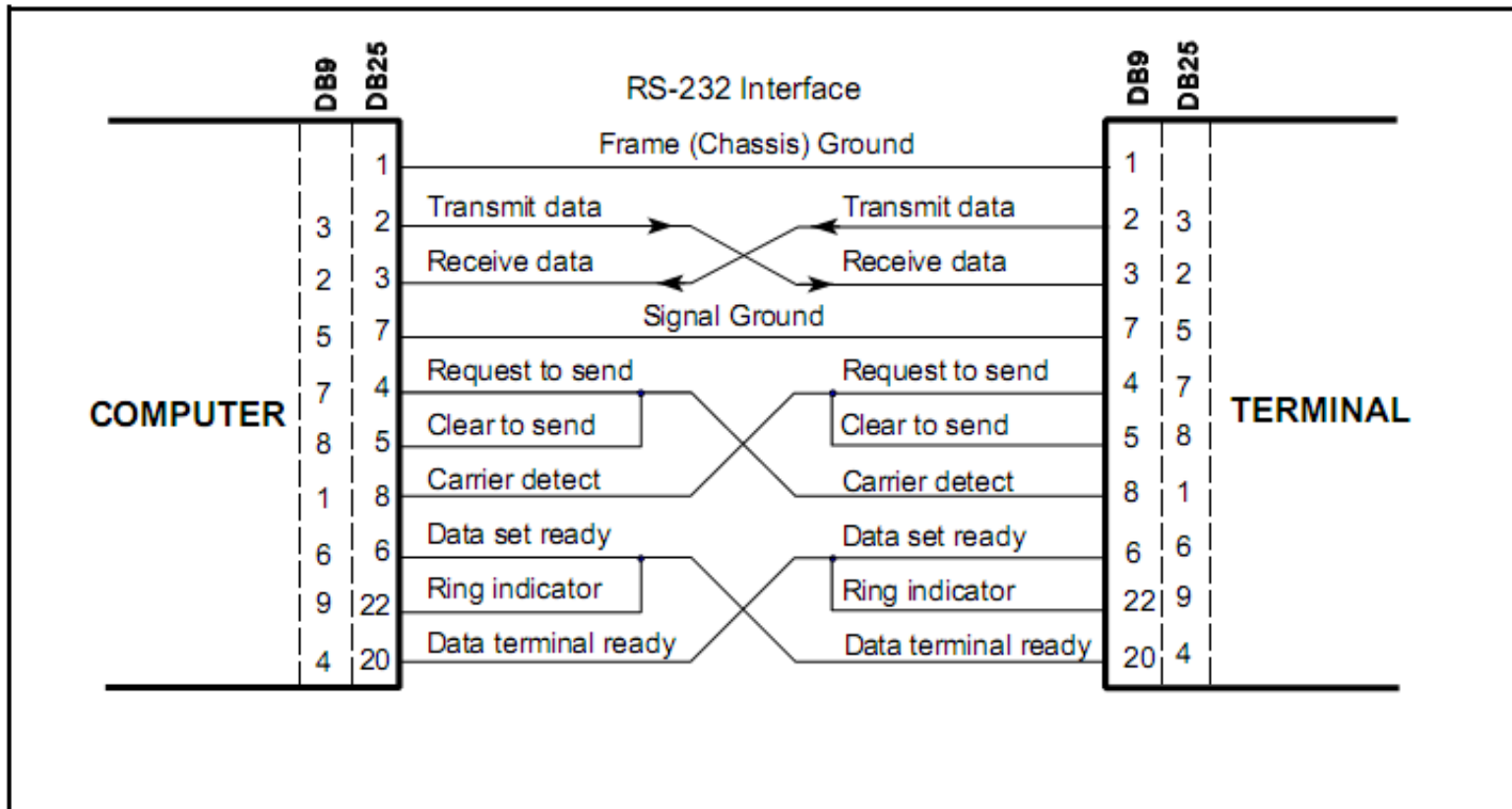
- **RECEIVED SIGNAL VOLTAGE**

binari 0 : +3 to +13 Vdc (space)

binari 1 : -3 to -13 Vdc (mark)

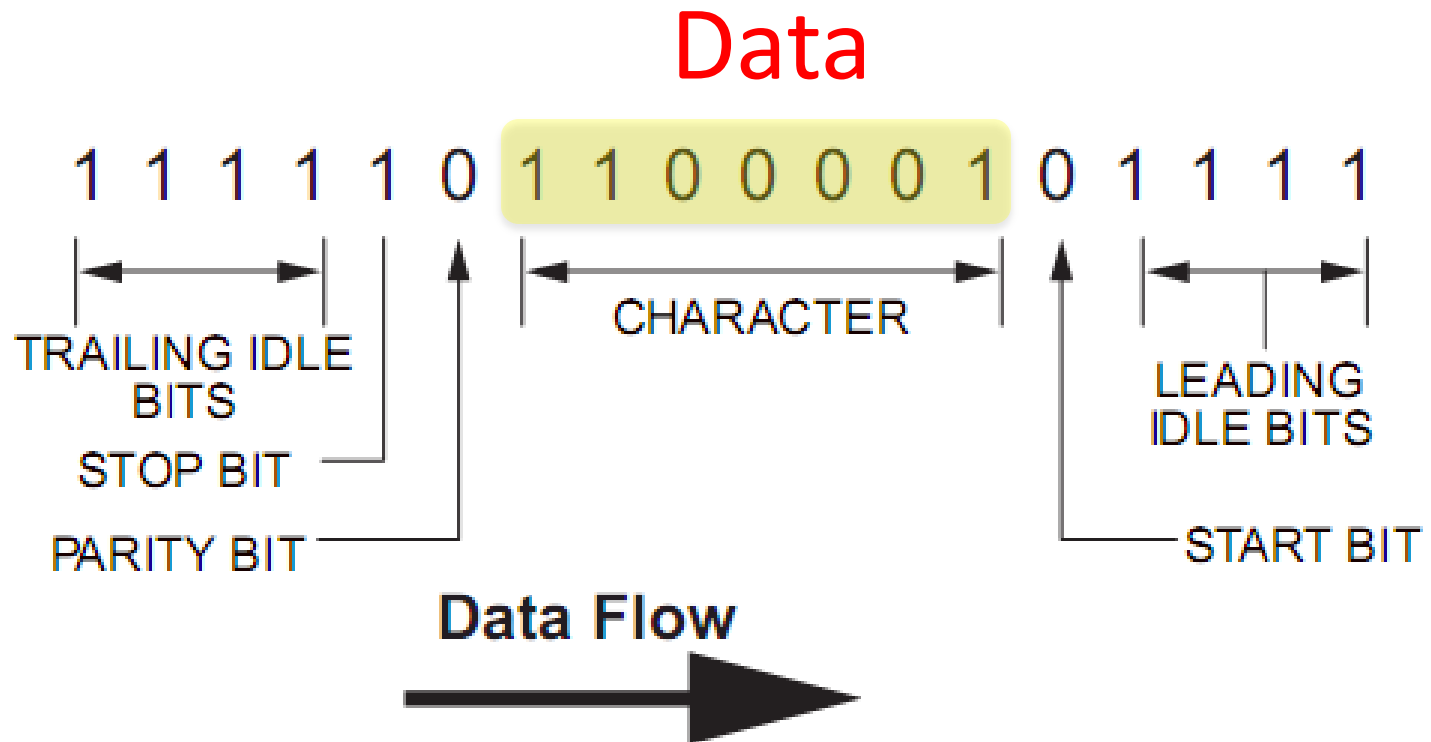


# RS-232 Direct Computer Interface



# Transmisi data Serial

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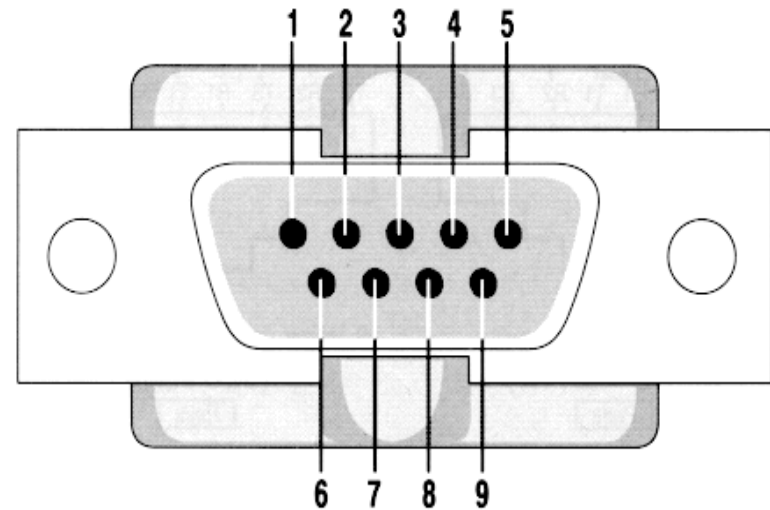


# RS-232 Signals



(serial port - PC side)

- Two independent channels are established for two-way communications.
- RS-232 can also carry additional signals used for flow control (RTS, CTS) and modem control (DCD, DTR, DSR, RI).



Pin	Signal	Pin	Signal
1	Data Carrier Detect	6	Data Set Ready
2	Received Data	7	Request to Send
3	Transmitted Data	8	Clear to Send
4	Data Terminal Ready	9	Ring Indicator
5	Signal Ground		



# PIN Functions

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Abbreviation	Full Name	Function
TD	Transmit Data	Serial Data Output (TXD)
RD	Receive Data	Serial Data Input (RXD)
CTS	Clear to Send	This line indicates that the Modem is ready to exchange data.
DCD	Data Carrier Detect	When the modem detects a "Carrier" from the modem at the other end of the phone line, this Line becomes active.
DSR	Data Set Ready	This tells the UART that the modem is ready to establish a link.
DTR	Data Terminal Ready	This is the opposite to DSR. This tells the Modem that the UART is ready to link.
RTS	Request To Send	This line informs the Modem that the UART is ready to exchange data.
RI	Ring Indicator	Goes active when modem detects a ringing signal from the PSTN.

# RS-232 Port Addressing

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Name	Address	IRQ
COM 1	3F8	4
COM 2	2F8	3
COM 3	3E8	4
COM 4	2E8	3

Start Address	Function
0000:0400	COM1's Base Address
0000:0402	COM2's Base Address
0000:0404	COM3's Base Address
0000:0406	COM4's Base Address

INT (Hex)	IRQ	Common Uses
08	0	System Timer
09	1	Keyboard
0A	2	Redirected
0B	3	Serial Comms. COM2/COM4
0C	4	Serial Comms. COM1/COM3
0D	5	Reserved/Sound Card
0E	6	Floppy Disk Controller
0F	7	Parallel Comms.
70	8	Real Time Clock
71	9	Reserved
72	10	Reserved
73	11	Reserved
74	12	PS/2 Mouse

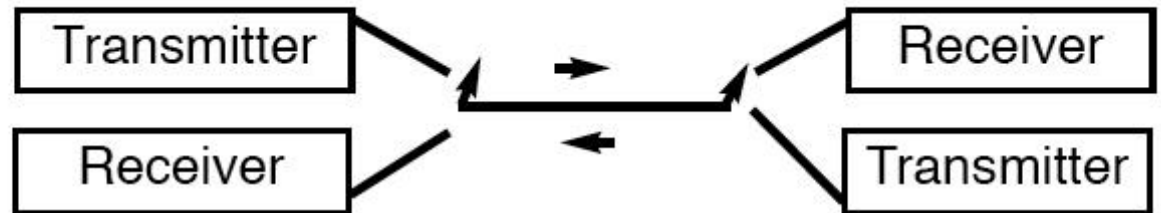
# Basic Serial Communication

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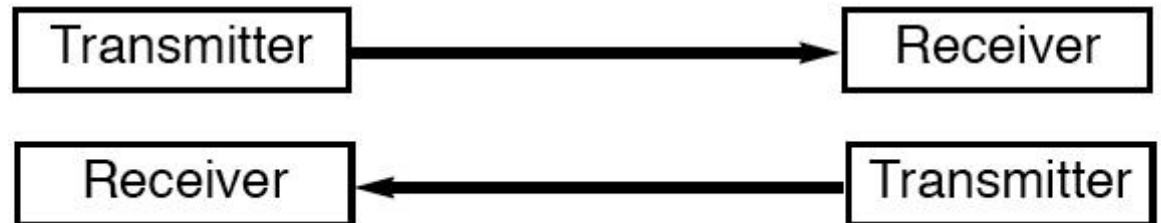
Simplex



Half Duplex



Full Duplex



# KOMUNIKASI SERIAL

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- Sinkron

Data dikirim bersama dengan sinyal clock

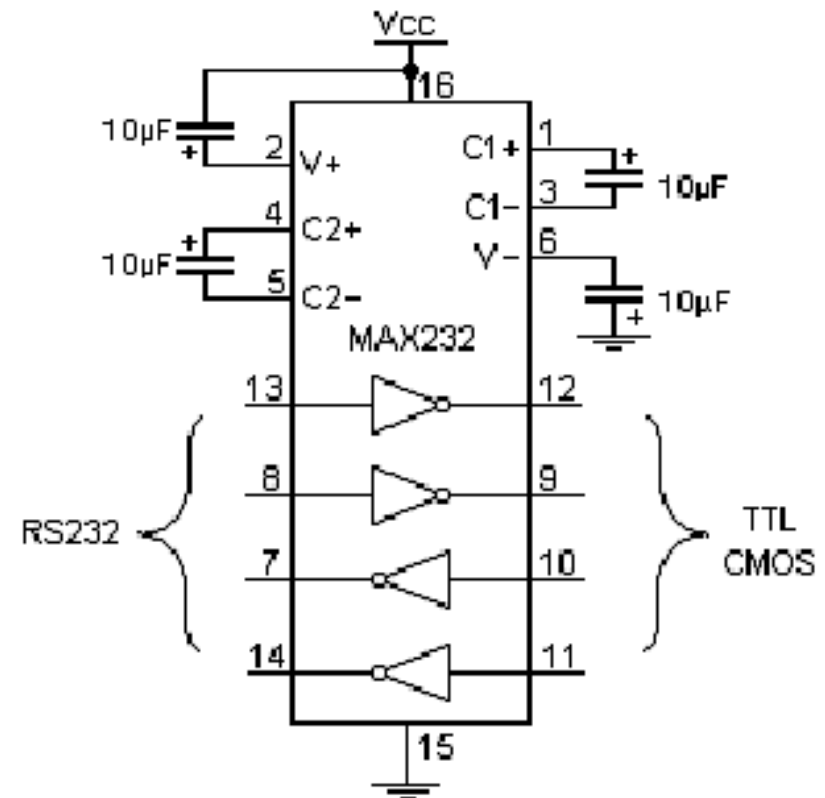
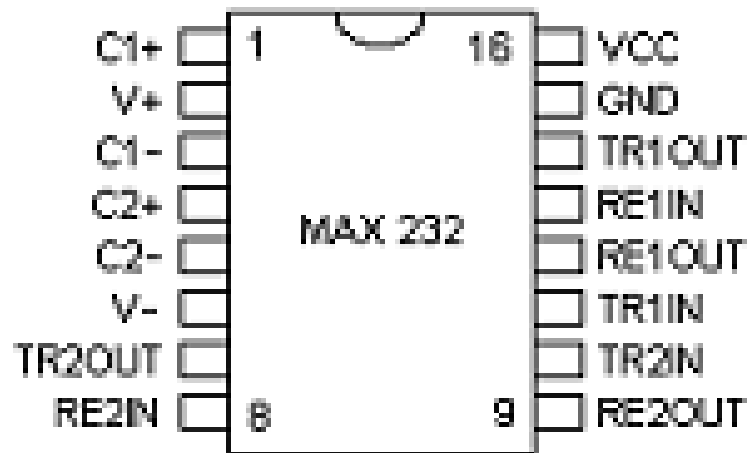
- I2C (Inter-Integrated Circuit)
- SPI (Serial Peripheral Interface)
  - Keyboard, mouse

- Asinkron

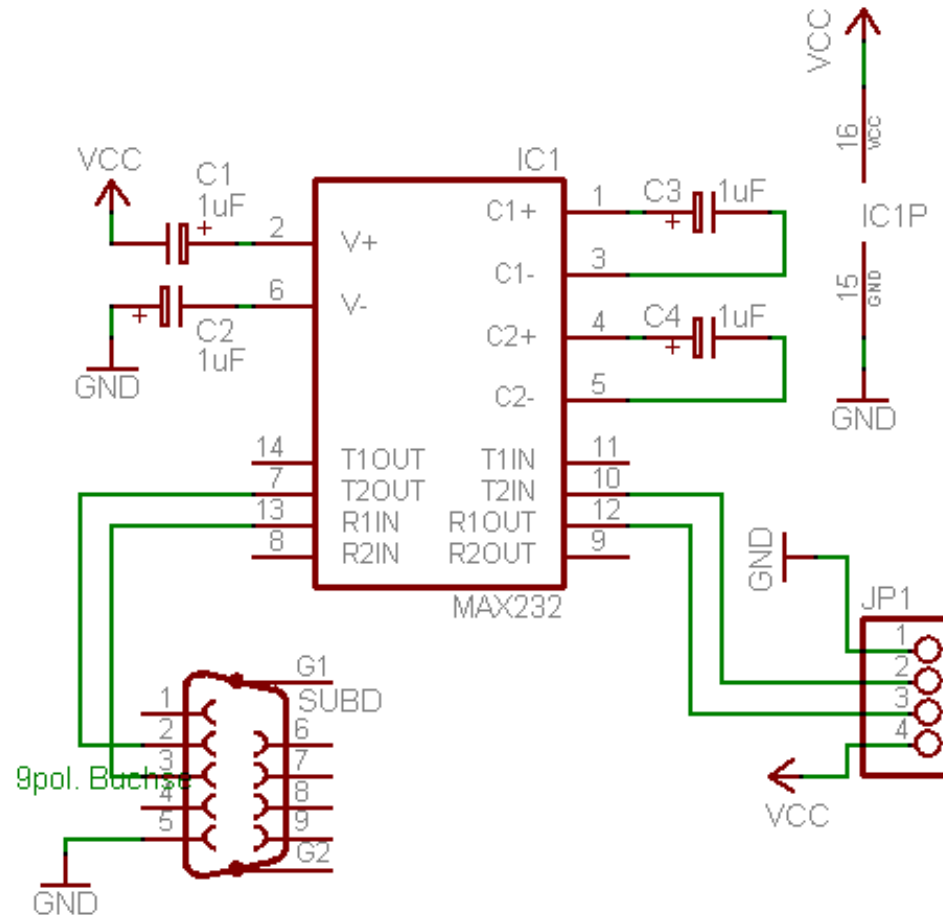
Data dikirim tanpa sinyal clock

- UART (RS-232)
  - Modem

# Profil MAX232



# RS232 Converter Schematic



# Tugas

- Rancang sebuah komunikasi serial dengan ketentuan:
  1. menggunakan 3-4 devais (master & slave)
  2. baudrate 9600
  3. speed rate 3Mbps
  4. buat protokol komunikasi data
  5. panjang kabel hingga 10 meter
  6. komunikasi 2 arah

Vise versa (UART)