perplexity

We will be generating a 8-bit UART hierarchically in Verilog. Please begin by generating a Baud Rate Generator defined as follows:

module BaudRateGenerator #(
parameter CLOCK_RATE = 100000000,
parameter BAUD_RATE = 9600,
parameter RX_OVERSAMPLE_RATE = 16
)(
input wire clk,
output reg rxClk,
output reg txClk
)
//Insert code here
endmodule

Here is a completed Verilog module for the Baud Rate Generator:

```
module BaudRateGenerator #(
    parameter CLOCK_RATE = 100000000,
    parameter BAUD_RATE = 9600,
    parameter RX_OVERSAMPLE_RATE = 16
)(
    input wire clk,
    output reg rxClk,
    output reg txClk
);

    // Calculate the number of clock cycles per baud period for RX and TX
    localparam RX_BAUD_CYCLES = CLOCK_RATE / (BAUD_RATE * RX_OVERSAMPLE_RATE);
    localparam TX_BAUD_CYCLES = CLOCK_RATE / BAUD_RATE;

    // Counters for RX and TX baud rate generation
    reg [31:0] rxCounter = 0;
    reg [31:0] txCounter = 0;

    // Signals to generate RX and TX clocks
    reg rxClkEnable = 0;
    reg txClkEnable = 0;

    always @(posedge clk) begin
        // Increment RX counter
        rxCounter <= rxCounter + 1;
        // Generate RX clock
        if (rxCounter == RX_BAUD_CYCLES - 1) begin
            rxCounter <= 0;
            rxClkEnable <= ~rxClkEnable;
        end

        // Increment TX counter
        txCounter <= txCounter + 1;

        // Generate TX clock
        if (txCounter == TX_BAUD_CYCLES - 1) begin
            txCounter <= 0;
            txClkEnable <= ~txClkEnable;
        end
    end

    // Assign output clocks
    assign rxClk = rxClkEnable;
    assign txClk = txClkEnable;

endmodule
```