By assuming y is 3-times differentiable we can look at two Taylor-expansions both around $t + h/2$. One for the point shifted by $h/2$,

$$y(t+h) = y\left(t+\frac{h}{2}\right) + \frac{h}{2}y'\left(t+\frac{h}{2}\right) + \frac{1}{8}y''\left(t+\frac{h}{2}\right) + o(h^3) \quad (1)$$

and the other at the point shifted by $-h/2$:

$$y(t) = y\left(t+\frac{h}{2}\right) - \frac{h}{2}y'\left(t+\frac{h}{2}\right) + \frac{1}{8}y''\left(t+\frac{h}{2}\right) + o(h^3) \qquad (2)$$

Now we subtract (2) from (1) to obtain

$$y(t+h) - y(t) = hy'\left(t+\frac{h}{2}\right) + o(h^3)$$

and this shows

$$\frac{y(t+h) - y(t)}{h} - y'\left(t+\frac{h}{2}\right) = o(h^3)$$

This is our first local error. But we have to deal with another which arises from the approximation of $y(t + h/2)$. Simply by applying Taylor we see

$$y\left(t+\frac{h}{2}\right) = y(t) + \frac{h}{2}y'(t) + o(h^2)$$

which gives second local error estimate

$$y\left(t+\frac{h}{2}\right) - y(t) - \frac{h}{2}f(t, y(t)) = o(h^2)$$