Node enumeration in 3D grid with 4×4×4 blocked layout

To compute the index u of a node with grid coordinates x, y and z, we use the formula

$$u = (x\&3) + ((y\&3) \ll 2) + ((z\&3) \ll 4) + (((x \gg 2) + ((y \gg 2) \cdot W_4) + ((z \gg 2) \cdot W_4 \cdot H_4)) \ll 6),$$

where $W_4 = \lfloor W/4 \rfloor$, $H_4 = \lfloor H/4 \rfloor$, W is the width and H is the height of the padded grid.

Neighbor index computation in 8-connected 2D grid with 8×8 blocked layout

To compute the index $N_{[ox,oy]}$ of a neighbor at coordinate offset $[ox, oy]$ from the node with index u, we use the functions

$$
\begin{aligned}
N_{[-1,\ 0]}(u) &= u + (\quad u \,\&000111_b\ ? -1 : -57\ ) \\
N_{[+1,\ 0]}(u) &= u + ((\sim u)\&000111_b\ ? +1 : +57\ ) \\
N_{[\ 0,-1]}(u) &= u + (\quad u \,\&111000_b\ ? -8 : -Y_{\text{ofs}}) \\
N_{[\ 0,+1]}(u) &= u + ((\sim u)\&111000_b\ ? +8 : +Y_{\text{ofs}}) \\
N_{[-1,-1]}(u) &= u + (\quad u \,\&000111_b\ ? -1 : -57\ ) + (\quad u \,\&111000_b\ ? -8 : -Y_{\text{ofs}}) \\
N_{[+1,-1]}(u) &= u + ((\sim u)\&000111_b\ ? +1 : +57\ ) + (\quad u \,\&111000_b\ ? -8 : -Y_{\text{ofs}}) \\
N_{[-1,+1]}(u) &= u + (\quad u \,\&000111_b\ ? -1 : -57\ ) + ((\sim u)\&111000_b\ ? +8 : +Y_{\text{ofs}}) \\
N_{[+1,+1]}(u) &= u + ((\sim u)\&000111_b\ ? +1 : +57\ ) + ((\sim u)\&111000_b\ ? +8 : +Y_{\text{ofs}}),
\end{aligned}
$$

where $Y_{\text{ofs}} = 8 \cdot (W - 8 + 1)$ and W is the width of the padded grid.

Neighbor index computation in 6-connected 3D grid with 4×4×4 blocked layout

To compute the index $N_{[ox,oy,oz]}$ of a neighbor at coordinate offset $[ox, oy, oz]$ from the node with index u, we use the functions

$$
\begin{aligned}
N_{[-1,0,0]}(u) &= \quad u \ \& \ 000011_b\ ? u - 1\ : u - 61 \\
N_{[+1,0,0]}(u) &= (\sim u) \ \& \ 000011_b\ ? u + 1\ : u + 61 \\
N_{[0,-1,0]}(u) &= \quad u \ \& \ 001100_b\ ? u - 4\ : u - Y_{\text{ofs}} \\
N_{[0,+1,0]}(u) &= (\sim u) \ \& \ 001100_b\ ? u + 4\ : u + Y_{\text{ofs}} \\
N_{[0,0,-1]}(u) &= \quad u \ \& \ 110000_b\ ? u - 16 : u - Z_{\text{ofs}} \\
N_{[0,0,+1]}(u) &= (\sim u) \ \& \ 110000_b\ ? u + 16 : u + Z_{\text{ofs}},
\end{aligned}
$$

where $Y_{\text{ofs}} = 16 \cdot W - 12$, $Z_{\text{ofs}} = 4 \cdot W \cdot H - 48$, W is the width and H is the height of the padded grid.

Neighbor index computation in 26-connected 3D grid with 4×4×4 blocked layout

To compute the index $N_{[ox,oy,oz]}$ of a neighbor at coordinate offset $[ox, oy, oz]$ from the node with index u, we use the functions

$$
\begin{aligned}
N_{[-1,\ 0,\ 0]}(u) &= u + (\quad u \,\&000011_b\ ? -1\ : -61\ ) \\
N_{[+1,\ 0,\ 0]}(u) &= u + ((\sim u)\&000011_b\ ? +1\ : +61\ ) \\
N_{[\ 0,-1,\ 0]}(u) &= u + (\quad u \,\&001100_b\ ? -4\ : -Y_{\text{ofs}}\ ) \\
N_{[\ 0,+1,\ 0]}(u) &= u + ((\sim u)\&001100_b\ ? +4\ : +Y_{\text{ofs}}\ ) \\
N_{[\ 0,\ 0,-1]}(u) &= u + (\quad u \,\&110000_b\ ? -16 : -Z_{\text{ofs}}\ ) \\
N_{[\ 0,\ 0,+1]}(u) &= u + ((\sim u)\&110000_b\ ? +16 : +Z_{\text{ofs}}\ ) \\
N_{[-1,-1,\ 0]}(u) &= u + (\quad u \,\&000011_b\ ? -1\ : -61\ ) + (\quad u \,\&001100_b\ ? -4\ : -Y_{\text{ofs}}\ ) \\
N_{[+1,-1,\ 0]}(u) &= u + ((\sim u)\&000011_b\ ? +1\ : +61\ ) + (\quad u \,\&001100_b\ ? -4\ : -Y_{\text{ofs}}\ ) \\
N_{[-1,+1,\ 0]}(u) &= u + (\quad u \,\&000011_b\ ? -1\ : -61\ ) + ((\sim u)\&001100_b\ ? +4\ : +Y_{\text{ofs}}\ ) \\
N_{[+1,+1,\ 0]}(u) &= u + ((\sim u)\&000011_b\ ? +1\ : +61\ ) + ((\sim u)\&001100_b\ ? +4\ : +Y_{\text{ofs}}\ ) \\
N_{[\ 0,-1,-1]}(u) &= u + (\quad u \,\&001100_b\ ? -4\ : -Y_{\text{ofs}}) + (\quad u \,\&110000_b\ ? -16 : -Z_{\text{ofs}}) \\
N_{[\ 0,+1,-1]}(u) &= u + ((\sim u)\&001100_b\ ? +4\ : +Y_{\text{ofs}}) + (\quad u \,\&110000_b\ ? -16 : -Z_{\text{ofs}}) \\
N_{[\ 0,-1,+1]}(u) &= u + (\quad u \,\&001100_b\ ? -4\ : -Y_{\text{ofs}}) + ((\sim u)\&110000_b\ ? +16 : +Z_{\text{ofs}}) \\
N_{[\ 0,+1,+1]}(u) &= u + ((\sim u)\&001100_b\ ? +4\ : +Y_{\text{ofs}}) + ((\sim u)\&110000_b\ ? +16 : +Z_{\text{ofs}}) \\
N_{[-1,\ 0,-1]}(u) &= u + (\quad u \,\&000011_b\ ? -1\ : -61\ ) + (\quad u \,\&110000_b\ ? -16 : -Z_{\text{ofs}}) \\
N_{[-1,\ 0,+1]}(u) &= u + (\quad u \,\&000011_b\ ? -1\ : -61\ ) + ((\sim u)\&110000_b\ ? +16 : +Z_{\text{ofs}}) \\
N_{[+1,\ 0,-1]}(u) &= u + ((\sim u)\&000011_b\ ? +1\ : +61\ ) + (\quad u \,\&110000_b\ ? -16 : -Z_{\text{ofs}}) \\
N_{[+1,\ 0,+1]}(u) &= u + ((\sim u)\&000011_b\ ? +1\ : +61\ ) + ((\sim u)\&110000_b\ ? +16 : +Z_{\text{ofs}}) \\
N_{[-1,-1,-1]}(u) &= u + (\quad u \,\&000011_b\ ? -1\ : -61\ ) + (\quad u \,\&001100_b\ ? -4\ : -Y_{\text{ofs}}) + (\quad u \,\&110000_b\ ? -16 : -Z_{\text{ofs}}) \\
N_{[+1,-1,-1]}(u) &= u + ((\sim u)\&000011_b\ ? +1\ : +61\ ) + (\quad u \,\&001100_b\ ? -4\ : -Y_{\text{ofs}}) + (\quad u \,\&110000_b\ ? -16 : -Z_{\text{ofs}}) \\
N_{[-1,+1,-1]}(u) &= u + (\quad u \,\&000011_b\ ? -1\ : -61\ ) + ((\sim u)\&001100_b\ ? +4\ : +Y_{\text{ofs}}) + (\quad u \,\&110000_b\ ? -16 : -Z_{\text{ofs}}) \\
N_{[+1,+1,-1]}(u) &= u + ((\sim u)\&000011_b\ ? +1\ : +61\ ) + ((\sim u)\&001100_b\ ? +4\ : +Y_{\text{ofs}}) + (\quad u \,\&110000_b\ ? -16 : -Z_{\text{ofs}}) \\
N_{[-1,-1,+1]}(u) &= u + (\quad u \,\&000011_b\ ? -1\ : -61\ ) + (\quad u \,\&001100_b\ ? -4\ : -Y_{\text{ofs}}) + ((\sim u)\&110000_b\ ? +16 : +Z_{\text{ofs}}) \\
N_{[+1,-1,+1]}(u) &= u + ((\sim u)\&000011_b\ ? +1\ : +61\ ) + (\quad u \,\&001100_b\ ? -4\ : -Y_{\text{ofs}}) + ((\sim u)\&110000_b\ ? +16 : +Z_{\text{ofs}}) \\
N_{[-1,+1,+1]}(u) &= u + (\quad u \,\&000011_b\ ? -1\ : -61\ ) + ((\sim u)\&001100_b\ ? +4\ : +Y_{\text{ofs}}) + ((\sim u)\&110000_b\ ? +16 : +Z_{\text{ofs}}) \\
N_{[+1,+1,+1]}(u) &= u + ((\sim u)\&000011_b\ ? +1\ : +61\ ) + ((\sim u)\&001100_b\ ? +4\ : +Y_{\text{ofs}}) + ((\sim u)\&110000_b\ ? +16 : +Z_{\text{ofs}}),
\end{aligned}
$$

where $Y_{\text{ofs}} = 16 \cdot W - 12$, $Z_{\text{ofs}} = 4 \cdot W \cdot H - 48$, W is the width and H is the height of the padded grid.