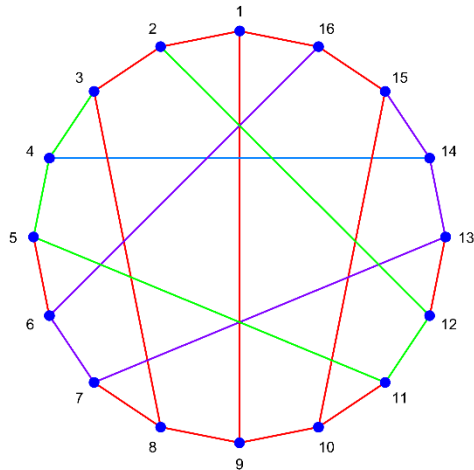
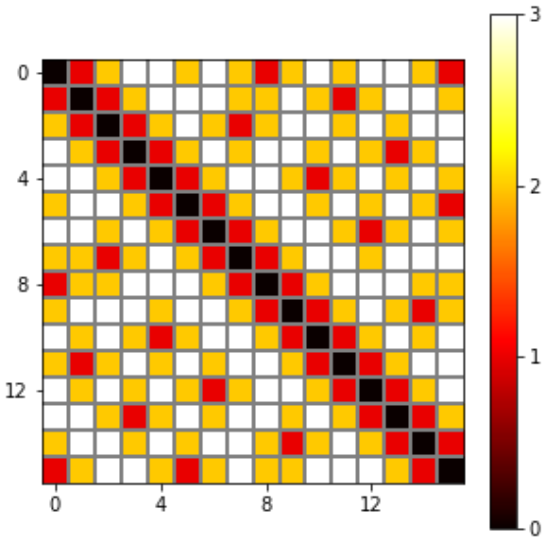

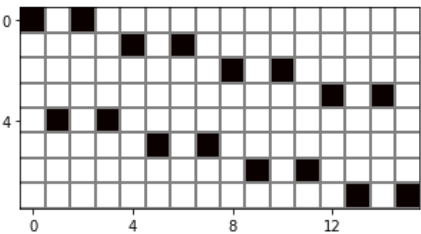
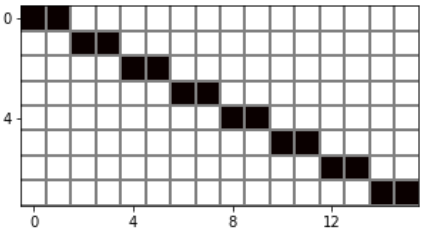
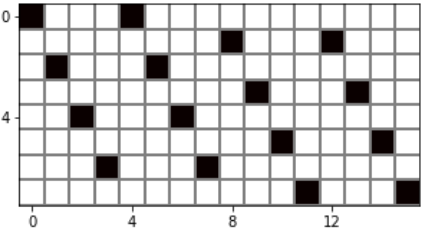
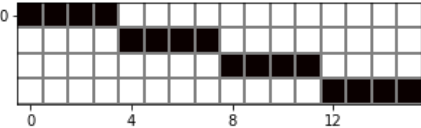
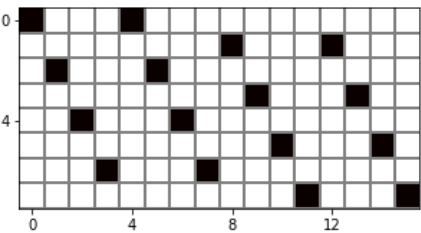
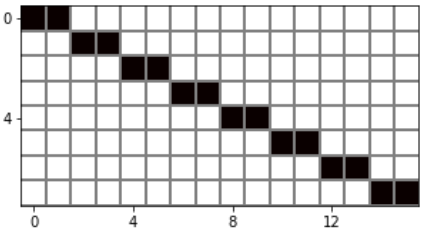


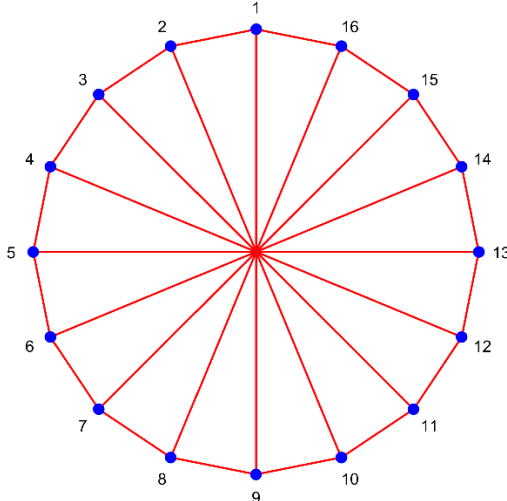
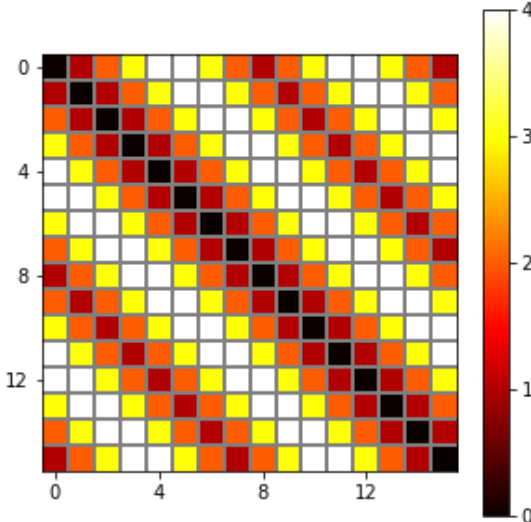

特定拓扑对不同并行矩阵乘法算法的适配性调查

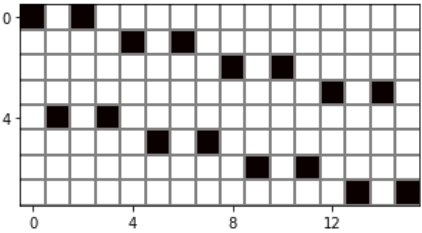
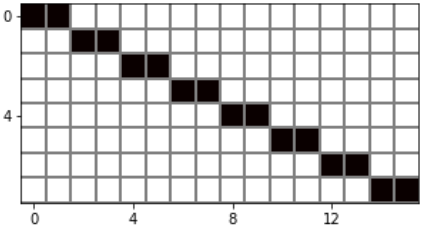
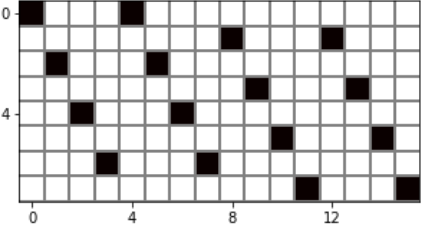

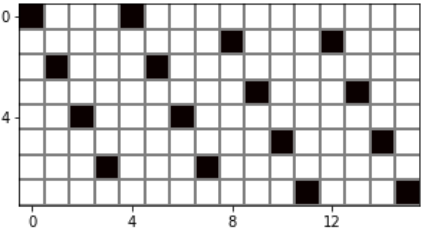
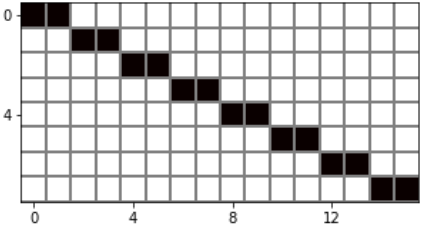
|   |                                |        |  |  |
|---|--------------------------------|--------|--|--|
| 16k2 ring                                   |                                |        |  |  |
| A = 4.2667                                  |                                |        | D = 8  |  |
| Topology Figure                             |                                |        |  |  |
| Distance Map                                |                                |        |  |  |
| Matrix Dimension: (m, l, n) = (128,128,128) |                                |        |  |  |
| Cube Dim                                    | Buffer Dim                     | Remark | Communication Rings                            | Reduce   |
| 8<br>× 128<br>× 128                         | A: 8<br>× 128<br>B: 8<br>× 128 | Cannon | Rings Matrix on A:<br><Empty>                  | <Empty>  |
|   |                                |        | Rings Matrix on B: <b>(Fully Utilized)</b><br> |  |
| 128<br>× 128<br>× 8                         | A:128<br>× 8<br>B:128<br>× 8   | SUMMA  | Rings Matrix on A:<br><Empty>                  | k_{ring} = 2 < k_{reduce} = \log P = 4<br>(Delayed by 2 steps) |
|   |                                |        | Rings Matrix on B:<br><Empty>                  |  |

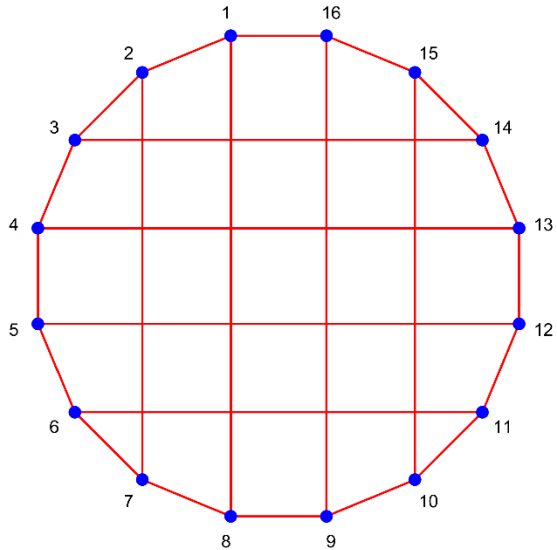
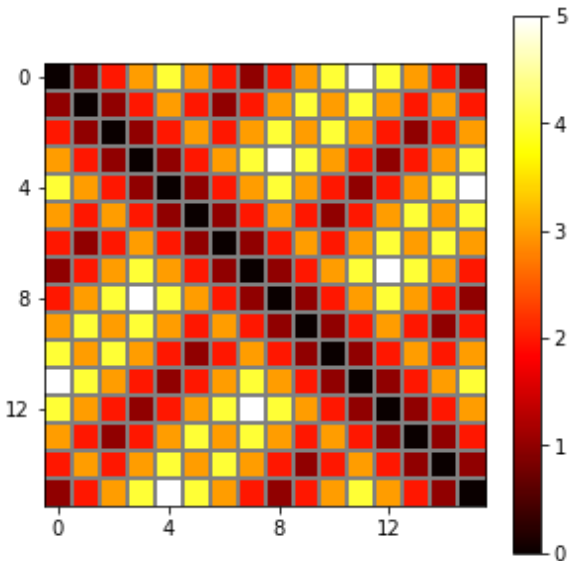
|                          |                                      |                           |   |   |
|--------------------------|--------------------------------------|---------------------------|---|---|
| $64 \times 64 \times 32$ | $A:64 \times 16$<br>$B:64 \times 16$ | Fox 1                     | <p>Rings Matrix on A:</p> <p>Rings Matrix on B: (<b>Fully Utilized</b>)</p>                             | $k_{ring} = 2 = k_{reduce} = \log A_z = 2$<br><b>(Fully Utilized)</b> |
| $32 \times 64 \times 64$ | $A:32 \times 32$<br>$B:64 \times 16$ | Fox 2                     | <p>Rings Matrix on A: (<b>Fully Utilized</b>)</p> <p>Rings Matrix on B: (<b>Delayed by 2 steps</b>)</p> | $k_{ring} = 2 > k_{reduce} = \log A_z = 1$<br><b>(Over Utilized)</b>  |
| $32 \times 64 \times 64$ | $A:32 \times 32$<br>$B:64 \times 32$ | Fox 2<br>(2x buf<br>On B) | <p>Rings Matrix on A: (<b>Fully Utilized</b>)</p> <p>Rings Matrix on B: (<b>Fully Utilized</b>)</p>     | $k_{ring} = 2 > k_{reduce} = \log A_z = 1$<br><b>(Over Utilized)</b>  |

|   |   |        |  |   |
|---|---|--------|--|---|
| 16k3  |   |        |  |   |
| A = 2.2000                                  |   |        | D = 3  |   |
| Topology Figure                             |   |        |  |   |
| Distance Map                                |  |        |  |   |
| Matrix Dimension: (m, l, n) = (128,128,128) |   |        |  |   |
| Cube Dim                                    | Buffer Dim  | Remark | Communication Rings  | Reduce  |
| 8<br>× 128<br>× 128                         | A: 8<br>× 128<br>B: 8<br>× 128  | Cannon | Rings Matrix on A:<br><Empty>  | <Empty>   |
|   |   |        | Rings Matrix on B: ( <b>Over Utilized</b> )<br> |   |
| 128<br>× 128<br>× 8                         | A:128<br>× 8<br>B:128<br>× 8  | SUMMA  | Rings Matrix on A:<br><Empty>  | k <sub>16k3</sub> = 3 < k <sub>reduce</sub> = log P = 4<br>(Delayed by 1 steps) |
|   |   |        | Rings Matrix on B:<br><Empty>  |   |

|  |  |                                    |  |  |
|--|--|------------------------------------|--|--|
| $\begin{matrix} 64 \\ \times 64 \\ \times 32 \end{matrix}$ | $\begin{matrix} A:64 \\ \times 16 \\ B:64 \\ \times 16 \end{matrix}$ | <p>Fox 1</p>                       | <p>Rings Matrix on A:</p>  <p>Rings Matrix on B: (<i>Over Utilized</i>)</p>                                | $k_{16k3} = 3 > k_{reduce} = \log A_z = 2$<br><i>(Over Utilized)</i> |
| $\begin{matrix} 32 \\ \times 64 \\ \times 64 \end{matrix}$ | $\begin{matrix} A:32 \\ \times 32 \\ B:64 \\ \times 16 \end{matrix}$ | <p>Fox 2</p>                       | <p>Rings Matrix on A: (<i>Over Utilized</i>)</p>  <p>Rings Matrix on B: (<i>Delayed by 2 steps</i>)</p>  | $k_{16k3} = 3 > k_{reduce} = \log A_z = 1$<br><i>(Over Utilized)</i> |
| $\begin{matrix} 32 \\ \times 64 \\ \times 64 \end{matrix}$ | $\begin{matrix} A:32 \\ \times 32 \\ B:64 \\ \times 32 \end{matrix}$ | <p>Fox 2<br/>(2x buf<br/>On B)</p> | <p>Rings Matrix on A: (<i>Over Utilized</i>)</p>  <p>Rings Matrix on B: (<i>Over Utilized</i>)</p>     | $k_{16k3} = 3 > k_{reduce} = \log A_z = 1$<br><i>(Over Utilized)</i> |

| 16k3  |   |        |  |  |
|---|---|--------|--|--|
| A = 2.6000                                  |   |        | D = 4  |  |
| Topology Figure                             |   |        |  |  |
| Distance Map                                |  |        |  |  |
| Matrix Dimension: (m, l, n) = (128,128,128) |   |        |  |  |
| Cube Dim                                    | Buffer Dim  | Remark | Communication Rings  | Reduce   |
| 8<br>× 128<br>× 128                         | A: 8<br>× 128<br>B: 8<br>× 128  | Cannon | Rings Matrix on A:<br><Empty>  | <Empty>  |
|   |   |        | Rings Matrix on B: ( <b>Over Utilized</b> )<br> |  |
| 128<br>× 128<br>× 8                         | A:128<br>× 8<br>B:128<br>× 8  | SUMMA  | Rings Matrix on A:<br><Empty>  | k <sub>16k3</sub> = 4 = k <sub>reduce</sub> = log P = 4<br>( <b>Fully Utilized</b> ) |
|   |   |        | Rings Matrix on B:<br><Empty>  |  |

|  |  |                                    |   |  |
|--|--|------------------------------------|---|--|
| $\begin{matrix} 64 \\ \times 64 \\ \times 32 \end{matrix}$ | $\begin{matrix} A:64 \\ \times 16 \\ B:64 \\ \times 16 \end{matrix}$ | <p>Fox 1</p>                       | <p>Rings Matrix on A:</p>  <p>Rings Matrix on B: (<i>Over Utilized</i>)</p>                             | $k_{16k3} = 3 > k_{reduce} = \log A_z = 2$ <p>(<i>Over Utilized</i>)</p> |
| $\begin{matrix} 32 \\ \times 64 \\ \times 64 \end{matrix}$ | $\begin{matrix} A:32 \\ \times 32 \\ B:64 \\ \times 16 \end{matrix}$ | <p>Fox 2</p>                       | <p>Rings Matrix on A: (<i>Over Utilized</i>)</p>  <p>Rings Matrix on B: (<i>Fully Utilized</i>)</p>  | $k_{16k3} = 3 > k_{reduce} = \log A_z = 1$ <p>(<i>Over Utilized</i>)</p> |
| $\begin{matrix} 32 \\ \times 64 \\ \times 64 \end{matrix}$ | $\begin{matrix} A:32 \\ \times 32 \\ B:64 \\ \times 32 \end{matrix}$ | <p>Fox 2<br/>(2x buf<br/>On B)</p> | <p>Rings Matrix on A: (<i>Over Utilized</i>)</p>  <p>Rings Matrix on B: (<i>Over Utilized</i>)</p>  | $k_{16k3} = 3 > k_{reduce} = \log A_z = 1$ <p>(<i>Over Utilized</i>)</p> |

|   |   |        |   |  |
|---|---|--------|---|--|
| 16k3  |   |        |   |  |
| $A = 2.2000$                                    |   |        | $D = 3$   |  |
| Topology<br>Figure                              |   |        |   |  |
| Distance<br>Map                                 |  |        |   |  |
| Matrix Dimension: $(m, l, n) = (128, 128, 128)$ |   |        |   |  |
| Cube<br>Dim                                     | Buffer<br>Dim   | Remark | Communication Rings   | Reduce   |
| $8 \times 128 \times 128$                       | $A: 8 \times 128$<br>$B: 8 \times 128$  | Cannon | Rings Matrix on A:<br><div>&lt;Empty&gt;</div>  | <Empty>  |
|   |   |        | Rings Matrix on B: ( <b>Over Utilized</b> )<br><div><div>0</div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div>04812</div></div> |  |
| $128 \times 128 \times 8$                       | $A: 128 \times 8$<br>$B: 128 \times 8$  | SUMMA  | Rings Matrix on A:<br><div>&lt;Empty&gt;</div>  | $k_{16k3} = 3 < k_{reduce} = \log P = 4$<br>(Delayed by 1 steps) |
|   |   |        | Rings Matrix on B:<br><div>&lt;Empty&gt;</div>  |  |

|                          |                                      |                           |   |  |
|--------------------------|--------------------------------------|---------------------------|---|--|
| $64 \times 64 \times 32$ | $A:64 \times 16$<br>$B:64 \times 16$ | Fox 1                     | <div data-bbox="524 191 1076 457">           Rings Matrix on A:            </div> <div data-bbox="524 468 1076 743">           Rings Matrix on B: (<i>Over Utilized</i>)            </div>                                | $k_{16k3} = 3 > k_{reduce} = \log A_z = 2$<br><i>(Over Utilized)</i> |
| $32 \times 64 \times 64$ | $A:32 \times 32$<br>$B:64 \times 16$ | Fox 2                     | <div data-bbox="524 760 1076 1037">           Rings Matrix on A: (<i>Over Utilized</i>)            </div> <div data-bbox="524 1047 1076 1234">           Rings Matrix on B: (<i>Delayed by 2 steps</i>)            </div> | $k_{16k3} = 3 > k_{reduce} = \log A_z = 1$<br><i>(Over Utilized)</i> |
| $32 \times 64 \times 64$ | $A:32 \times 32$<br>$B:64 \times 32$ | Fox 2<br>(2x buf<br>On B) | <div data-bbox="524 1249 1076 1526">           Rings Matrix on A: (<i>Over Utilized</i>)            </div> <div data-bbox="524 1537 1076 1812">           Rings Matrix on B: (<i>Over Utilized</i>)            </div>     | $k_{16k3} = 3 > k_{reduce} = \log A_z = 1$<br><i>(Over Utilized)</i> |