Problem 1
Consider the linear system \( Ax = b \) that represents the discrete transmission problem, meaning
\[
A = \begin{pmatrix}
A_{II}^{(1)} & 0 & A_{IT}^{(1)} \\
0 & A_{II}^{(2)} & A_{IT}^{(2)} \\
A_{TI}^{(1)} & A_{TI}^{(2)} & A_{TT}
\end{pmatrix}, \quad x = \begin{pmatrix}
u_{I}^{(1)} \\
u_{I}^{(2)} \\
u_{T}
\end{pmatrix}, \quad b = \begin{pmatrix}
f_{I}^{(1)} \\
f_{I}^{(2)} \\
f_{T}
\end{pmatrix}.
\]

Now consider a splitting method for the above equation system. This uses a splitting \( A = B + (A - B) \) with \( B \) invertible to define an iteration via
\[
Bx^{k+1} = (B - A)x^{(k)} + b.
\]

Find the splitting that defines the discrete Dirichlet-Neumann iteration for the above problem.
Remember: \( A_{TT} = A_{IT}^{(1)} + A_{IT}^{(2)} \).

Problem 2
Log in onto LUNARC. The following assignments are supposed to help you make yourself familiar with the setting.

a) Get your hello world program to run on Aurora.

b) Get your Laplace problem class with the matrix vector product to run on Aurora sequentially.

c) Use the implementation of CG in PETSc to solve the arising linear equation system.

d) Optional: Do this in parallel.

Return: Tuesday, 10th of October