objective:

$$\min \sum_{f \in F,\ n \in N} location_{f,n} \times fragment\ size_f$$

constraints:

$$\sum_{n \in N} runnable_{q,n} \geq 1 \text{ for } q \in Q$$

$$\sum_{n \in N} workshare_{q,n} = 1 \text{ for } q \in Q$$

$$runnable_{q,n} \times \sum_{f \in F} queries_{f,q} \leq \sum_{f \in F} location_{f,n} \times queries_{f,q} \text{ for } q \in Q,\ n \in N$$

$$workshare_{q,n} \leq runnable_{q,n} \text{ for } q \in Q,\ n \in N$$

$$\sum_{q \in Q} workshare_{q,n} \times workload_q = \frac{total\ workload}{num\ nodes} \text{ for } n \in N$$

variables:

$$q \in Q$$
$$f \in F$$
$$n \in N$$

$$location_{f,n}$$
$$runnable_{q,n}$$
$$workshare_{q,n}$$

$$cost_q * frequency_q = workload_q$$
$$total\ workload = \sum_{q \in Q} workload_q$$