Definition 1. *The minimum load of τ_i in Z_k is the minimum units of execution time that must be assigned to τ_i in Z_k to meet the deadline.*

$$Lt_{i,k} = MAX(0, ZWidth_k - L_{i,k})$$

Definition 2. *The maximum load of τ_i in Z_k is the maximum units of execution time that can be assigned to τ_i in Z_k considering the WCET of a job and the width of a Zone(to ensure a task can only be executed in a processor at a time).*

$$Mt_{i,k} = MIN(R_{i,k}, ZWidth_k)$$

Definition 3. *The execution assignment is **rational** in Z_k if execution time assigned to each task is between minimum load and maximum load, and the sum of execution time of tasks in Γ doesn't exceed the capacity of Z_k.*

$$\forall i \in [0, n) : Lt_{i,k} \leq alloc_{i,k} \leq Mt_{i,k}$$

$$\sum_{i=0}^{n-1} alloc_{i,k} \leq Cap_k$$

Definition 4. ***Overload effect** occurs if the total minimum load of tasks in Γ is more than the capacity of Z_k.*

$$\sum_{i=0}^{n-1} Lt_{i,k} > Cap_k$$

Definition 5. *Zone Z_p **zone-connects** to zone Z_q in $J_{i,k}$, denoted as $Z_p \rightarrow Z_q$, if*

$$Z_p \in J_{i,k}, Z_q \in J_{i,k}$$

and

$$alloc_{i,p} > 0, alloc_{i,q} < ZWidth_q.$$

*The connection between Z_p and Z_q is called a **zone-connection**.*

Definition 6. *Zone Z_p **connects** to zone Z_q denoted as $Z_p \Rightarrow Z_q$ if*

$$Z_p \rightarrow Z_q$$

or

$$\exists k : Z_p \Rightarrow Z_k, Z_k \Rightarrow Z_q.$$

Definition 7. *During scheduling, the current zone Z_s is called a **source zone** if overload effect occured in Z_s.*

Definition 8. *In a source zone Z_s, a **source point** $alloc_{i,s}$ is an element in scheduling matrix such that: $alloc_{i,s} > 0$ and $L_{i,s} < T_i - C_i$.*

Definition 9. *During scheduling, the overload effect occurs in the current zone Z_s. A zone Z_d is called a* ***destination zone*** *if*
(1) $\exists J_{i,j}$ is a current job ($JStart_{i,j} \leq ZStart_s, JEnd_{i,j} \geq ZEnd_s$), $Z_d \in J_{i,j}$, $alloc_{i,d} > 0$, $L_{i,s} > 0$. or
(2) $Rem_d > 0$.
The element $alloc_{i,d}$ in scheduling matrix is called a ***destination point****.*

Lemma 1. *When overload effect occurs in Z_k, there exist a source point $alloc_{i,k}$.*

Proof. Γ_l is the task set that $\forall \tau_i \in \Gamma_l : alloc_{i,k} > 0$. It is obvious that $\Gamma_l \neq \emptyset$. □

Lemma 2. *When overload effect occurs in Z_k, there exist a destination zone Z_d, if $Rem_d = 0$, there exist a destination point $alloc_{i,d}$.*

Proof. ... □

Lemma 3. *For a taskset Γ with a total utilization of $m * ut$ ($0 < ut \leq 1$), if execution assignment is rational in each zone Z_i ($i \in [0, k), k \leq znum$), and overload effect occurs in zone Z_k, then $\exists Z_d$ is a destination zone, $d \neq k$, $Z_k \Rightarrow Z_d$.*

Proof. ... □