

C:/Users/torsten/GitHub/colore/ontologies/owltime/owltime.clif

$$\begin{aligned}
& \forall t1 \forall t2 \left[ \left[ \text{before}(t1, t2) \rightarrow \neg (= (t1, t2)) \right] \right] \\
& \forall t1 \forall t2 \left[ \left[ \text{before}(t1, t2) \rightarrow \neg (\text{before}(t2, t1)) \right] \right] \\
& \forall t1 \forall t2 \forall t3 \left[ \left[ (\text{before}(t1, t2) \wedge \text{before}(t2, t3)) \rightarrow \text{before}(t1, t3) \right] \right] \\
& \forall t \left[ \left[ \text{Instant}(t) \rightarrow \text{TemporalEntity}(t) \right] \right] \\
& \forall t \left[ \left[ \text{Interval}(t) \rightarrow \text{TemporalEntity}(t) \right] \right] \\
& \forall t \left[ \left[ \text{TemporalEntity}(t) \rightarrow (\text{Interval}(t) \vee \text{Instant}(t)) \right] \right] \\
& \forall t \forall x \left[ \left[ \text{begins}(t, x) \rightarrow (\text{Instant}(t) \wedge \text{TemporalEntity}(x)) \right] \right] \\
& \forall t \forall x \left[ \left[ \text{ends}(t, x) \rightarrow (\text{Instant}(t) \wedge \text{TemporalEntity}(x)) \right] \right] \\
& \forall t \left[ \left[ \text{Instant}(t) \leftrightarrow \text{begins}(t, t) \right] \right] \\
& \forall t \left[ \left[ \text{Instant}(t) \leftrightarrow \text{ends}(t, t) \right] \right] \\
& \forall x \forall t1 \forall t2 \left[ \left[ (\text{TemporalEntity}(x) \wedge \text{begins}(t1, x) \wedge \text{begins}(t2, x)) \rightarrow = (t1, t2) \right] \right] \\
& \forall x \forall t1 \forall t2 \left[ \left[ (\text{TemporalEntity}(x) \wedge \text{ends}(t1, x) \wedge \text{ends}(t2, x)) \rightarrow = (t1, t2) \right] \right] \\
& \forall x \forall t1 \forall t2 \left[ \left[ \text{timeBetween}(x, t1, t2) \rightarrow (\text{TemporalEntity}(x) \wedge \text{Instant}(t1) \wedge \text{Instant}(t2)) \right] \right] \\
& \forall t1 \forall t2 \left[ \left[ \neg (= (t1, t2)) \rightarrow \forall x \left[ \left[ \text{timeBetween}(x, t1, t2) \leftrightarrow (\text{begins}(t1, x) \wedge \text{ends}(t2, x)) \right] \right] \right] \right] \\
& \forall x \forall t1 \forall t2 \left[ \left[ (\text{Interval}(x) \wedge \text{begins}(t1, x) \wedge \text{ends}(t2, x)) \rightarrow \neg (\text{before}(t2, t1)) \right] \right] \\
& \forall x \forall t1 \forall t2 \left[ \left[ (\text{ProperInterval}(x) \wedge \text{begins}(t1, x) \wedge \text{ends}(t2, x)) \rightarrow \text{before}(t1, t2) \right] \right] \\
& \forall t1 \forall t2 \left[ \left[ (\text{Instant}(t1) \wedge \text{Instant}(t2) \wedge \text{before}(t1, t2)) \rightarrow \exists x \left[ \text{timeBetween}(x, t1, t2) \right] \right] \right] \\
& \forall x \left[ \left[ \left[ \text{ProperInterval}(x) \leftrightarrow \left( \text{Interval}(x) \wedge \forall t1 \forall t2 \left[ \left[ (\text{begins}(t1, x) \wedge \text{ends}(t2, x)) \rightarrow \neg (= (t1, t2)) \right] \right] \right) \right] \right] \right] \\
& \forall t \forall x \left[ \left[ \text{inside}(t, x) \rightarrow (\text{Instant}(t) \wedge \text{Interval}(x)) \right] \right] \\
& \forall t \forall x \left[ \left[ \text{beginsOrIn}(t, x) \leftrightarrow (\text{begins}(t, x) \vee \text{inside}(t, x)) \right] \right] \\
& \forall t \forall t1 \forall t2 \forall x \left[ \left[ (\text{inside}(t, x) \wedge \text{begins}(t1, x) \wedge \text{ends}(t2, x) \wedge \text{ProperInterval}(x)) \rightarrow (\text{before}(t1, t) \wedge \text{before}(t, t2)) \right] \right]
\end{aligned}$$

$$\begin{aligned}
& \forall t1 \forall t2 \forall i \left[ \left[ \left( \text{inside}(t1, i) \wedge \text{inside}(t2, i) \right) \rightarrow \left( \text{before}(t1, t2) \vee \text{before}(t2, t1) \vee \text{=(}t1, t2\text{)} \right) \right] \right] \\
& \forall i \forall t1 \forall t2 \left[ \left[ \left( \text{inside}(t1, i) \wedge \text{begins}(t2, i) \right) \rightarrow \text{before}(t2, t1) \right] \right] \\
& \forall i \forall t1 \forall t2 \left[ \left[ \left( \text{inside}(t1, i) \wedge \text{ends}(t2, i) \right) \rightarrow \text{before}(t1, t2) \right] \right] \\
& \forall e \left[ \left[ \text{Eventuality}(e) \rightarrow \neg \left( \text{TemporalEntity}(e) \right) \right] \right] \\
& \forall e \forall t \left[ \left[ \text{atTime}(e, t) \rightarrow \text{Eventuality}(e) \right] \right] \\
& \forall e \forall t \left[ \left[ \text{during}(e, t) \rightarrow \text{Eventuality}(e) \right] \right] \\
& \forall t \forall e \left[ \left[ \text{timeSpan}(t, e) \rightarrow \left( \text{Eventuality}(e) \wedge \text{TemporalEntity}(t) \right) \right] \right] \\
& \forall e \forall t \left[ \left[ \text{atTime}(e, t) \rightarrow \text{Instant}(t) \right] \right] \\
& \forall e \forall t \left[ \left[ \text{during}(e, t) \rightarrow \text{Interval}(t) \right] \right] \\
& \forall e \forall t1 \forall t2 \left[ \left[ \left( \text{during}(e, t1) \wedge \text{inside}(t2, t1) \right) \rightarrow \text{atTime}(e, t2) \right] \right] \\
& \forall e \forall t \forall t1 \left[ \left[ \left( \text{during}(e, t) \wedge \text{intDuring}(t1, t) \right) \rightarrow \text{during}(e, t1) \right] \right] \\
& \forall t \forall e \left[ \left[ \left( \text{timeSpan}(t, e) \wedge \text{Interval}(t) \right) \rightarrow \text{during}(e, t) \right] \right] \\
& \forall t \forall e \left[ \left[ \left( \text{timeSpan}(t, e) \wedge \text{Instant}(t) \right) \rightarrow \text{atTime}(e, t) \right] \right] \\
& \forall t1 \forall t2 \forall e \left[ \left[ \left( \text{timeSpan}(t1, e) \wedge \text{Interval}(t2) \wedge \text{atTime}(e, t2) \right) \rightarrow \left( \text{inside}(t2, t1) \vee \text{begins}(t2, t1) \vee \text{ends}(t2, t1) \right) \right] \right] \\
& \forall t \forall t1 \forall e \left[ \left[ \left( \text{timeSpan}(t, e) \wedge \text{Instant}(t) \wedge \text{atTime}(e, t1) \right) \rightarrow \text{=(}t, t1\text{)} \right] \right]
\end{aligned}$$