

LINEAR TEMPORAL LOGIC

Writing LTL Specifications

- (a) **Mutual Exclusion:** processes 1 and 2 are never simultaneously in their critical sections.

- (b) **Client-Server Systems:** the system responds to all requests, but provides no guarantee on the timeline for responses.

- (c) **Traffic Light:** whenever red, the light cannot become green immediately afterwards.

- (d) **Traffic Light:** once red, the light always becomes green eventually after being yellow for some time.

Proving/Disproving LTL Equalities

(a) $\Diamond(\varphi \wedge \psi) \equiv \Diamond\varphi \wedge \Diamond\psi$

(b) $\Diamond(\varphi \vee \psi) \equiv \Diamond\varphi \vee \Diamond\psi$

(c) $\Box(\varphi \vee \psi) \equiv \Box\varphi \vee \Box\psi$

(d) $\phi\mathbf{U}\psi \equiv \psi \vee (\varphi \wedge \bigcirc(\varphi\mathbf{U}\psi))$

(e) $\Diamond\Box(\varphi \vee \psi) \equiv \Diamond\Box\varphi \vee \Diamond\Box\psi$