Lecture 7

Thursday, May 23, 2019 5:53 PM

TM for $L = \{ 0^n | n > 0 \}$ $\frac{1}{2} \frac{1}{2} \frac{1}$ $- \Sigma = \{0, 1\}$ $\Gamma = \{0, 1, u\}$ · S : $\underline{S}(q_0, \sqcup) = (q_{\alpha u}, \sqcup, R)$ $S(p_{0}, 1) = (q_{rij}, 1, R)$ $\delta(q_{0}, 0) = (q_{1}, u, R)$ will take up to the right-most input symbol $\delta(q_1, 0) = (q_1, 0, R)$ 91 $\delta(q_{1}, 1) = (q_{1}, 1, R)$ $\delta(q_1, \upsilon) = (q_2, \upsilon, L)$ check that we see I now! g/2 :
$$\begin{split} & S(q_2, 0) = (q_{rej}, 0, R) \\ & S(q_2, U) = (q_{rej}, U, R) \\ & S(q_2, U) = (q_{rej}, U, R) \\ & S(q_2, 1) = (q_3, U, L) \end{split}$$

 $\delta(q_{2}, 1) = (q_{3}, L, L)$ takes us to the left-most (remaining) input symbol 13: $\delta(q_{3},0) = (q_{3},0,L)$ $\delta(q_{3}, 1) = (q_{3}, 1, L)$ $\delta(q_{3}, U) = (q_{0}, U, R)$ (93) 0.,0,L $PAL = \frac{1}{2} w \in [0,1]^* \ W = w^{T}$ 010, 11, E E PAL 01 & PAL 40 remember the symbol it sees 2-tape TM

2-tape IM PHL X, X2 Xn = Xn Xn ... X2 X1 DIMIXET I Xn U input tape /read-only) Xi X2.... Xn ext tope (read/write) go Hape S: QXT > QXT X EL, RJ 2-tape S: QX (~ -> QX (~ X {L, R}) Claim: PAL is in O(n) time on a 2-tape TM. <u>Remark</u>: PAL requires $S(n^2)$ Hume on a 1-tape TM. <u>Claim</u>: $\forall \angle \in Time(t_{\kappa})$ on a K-tape TM, $\exists a \ L tape TM \ for \ L$ with runtime $\Omega(t_{e}^{2})$.

with runtime $Q(t_{k})$. I terres I-tape TM # tape 1 # tape 2 # ... # tape K # $\begin{array}{ccc} \Gamma & \rightarrow & \Gamma & \downarrow & \uparrow \\ \downarrow & \downarrow & e & \Gamma \\ \end{array} , & & & & \uparrow & \uparrow \\ \end{array}$ Other variants of TM 1-tape 2-3 tape K-tape K-head etc. RAM 1-tape TM, with only poly-blourup in runtime. UTM