fifo+[11,40]

forclients C sends FIFO
  from j to i via (S[j,i],*codes*)
  receives at i via (R[i],*decodes*) requests Req[j] are acknowledged by Ack[j,i]
$\equiv_{\text{def}}$ $\forall i{:}C.$
  $\exists f{:}\{e{:}\text{E}|\ R(i,e)\} \rightarrow \{e{:}\text{E}|\ \exists j{:}C.\ (S(j,i,e))\}$
   $(\lambda e.\exists j{:}C.\ (S(j,i,e)) \leftarrow\!\!\leftarrow f\!\!-\!\!- \lambda e.R(i,e)$
   & $(\forall e{:}\{e{:}\text{E}|\ R(i,e)\}\ ,\ j{:}\{j{:}C|\ S(j,i,f(e))\}\ .$
      $decodes(i,e,(\text{state when } e)) = codes(j,i,f(e),(\text{state when } f(e))))$
   & $(\forall e,\ e'{:}\{e{:}\text{E}|\ R(i,e)\}\ ,\ j{:}C.$
      $(S(j,i,f(e))) \Rightarrow (S(j,i,f(e'))) \Rightarrow f(e)\ \text{c}{\leq}\ f(e') \Rightarrow e\ \text{c}{\leq}\ e')$
   & $(\forall j{:}C.$
      $\exists req{:}\{e{:}\text{E}|\ Ack(j,i,e)\} \rightarrow \{e{:}\text{E}|\ S(j,i,e)\ \&\ Req(j,e)\}$
       $(\lambda e.S(j,i,e)\ \&\ Req(j,e) \leftarrow\!\!\leftarrow req\!\!-\!\!- \lambda e.Ack(j,i,e)$
       & $(\forall a{:}\{e{:}\text{E}|\ Ack(j,i,e)\}\ .\ \exists e{:}\{e{:}\text{E}|\ R(i,e)\}\ .\ (f(e) = req(a)\ \&\ e\ \text{c}{\leq}\ a))$
       & $e.req(e)$ is c< preserving on $e.Ack(j,i,e)))$

clarification:

fifo+(es;*codes*;*decodes*;C;S;R;T;Req;Ack)
$\equiv_{\text{def}}$ $\forall i{:}C.$
  $\exists f{:}\{e{:}\text{es-E}(es)|\ R(i,e)\} \rightarrow \{e{:}\text{es-E}(es)|\ \exists j{:}C.\ (S(j,i,e))\}$
   (antecedent-surjection(es;$\lambda e.R(i,e)$;$\lambda e.\exists j{:}C.\ (S(j,i,e))$;$f$)
   & $(\forall e{:}\{e{:}\text{es-E}(es)|\ R(i,e)\}\ ,\ j{:}\{j{:}C|\ S(j,i,f(e))\}\ .$
      $decodes(i,e,\text{es-state-when}(es;e)) = codes(j,i,f(e),\text{es-state-when}(es;f(e))) \in T)$
   & $(\forall e{:}\{e{:}\text{es-E}(es)|\ R(i,e)\}\ ,\ e'{:}\{e{:}\text{es-E}(es)|\ R(i,e)\}\ ,\ j{:}C.$
      $(S(j,i,f(e)))$
      $\Rightarrow (S(j,i,f(e')))$
      $\Rightarrow \text{es-causle}(es;f(e);f(e'))$
      $\Rightarrow \text{es-causle}(es;e;e'))$
   & $(\forall j{:}C.$
      $\exists req{:}\{e{:}\text{es-E}(es)|\ Ack(j,i,e)\} \rightarrow \{e{:}\text{es-E}(es)|\ S(j,i,e)\ \&\ Req(j,e)\}$
       (antecedent-surjection(es;$\lambda e.Ack(j,i,e)$;$\lambda e.S(j,i,e)\ \&\ Req(j,e)$;$req$)
       & $(\forall a{:}\{e{:}\text{es-E}(es)|\ Ack(j,i,e)\}\ .$
          $\exists e{:}\{e{:}\text{es-E}(es)|\ R(i,e)\}\ .\ (f(e) = req(a) \in \text{es-E}(es)\ \&\ \text{es-causle}(es;e;a)))$
       & causal-order-preserving(es;$e.req(e)$;$e.Ack(j,i,e)$)))))

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http://www.nuprl.org/FDLcontent/p0_963683_/p31_701418_{fifo!}.html