

Chapter 24

Socket Interface

- **Sockets**
- **Socket System Calls**
- **Connectionless Iterative Server**
- **UDP Client-Server Programs**
- **Connection-Oriented Concurrent Server**
- **TCP Client-Server Programs**

Figure 24-1

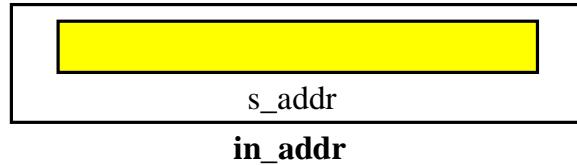
Data types

u_char	Unsigned 8-bit character
u_short	Unsigned 16-bit integer
u_long	Unsigned 32-bit integer

Slides from *TCP/IP* - Forouzan

Figure 24-2

Internet address structure



```
struct in_addr  
{  
    u_long s_addr ;  
};
```

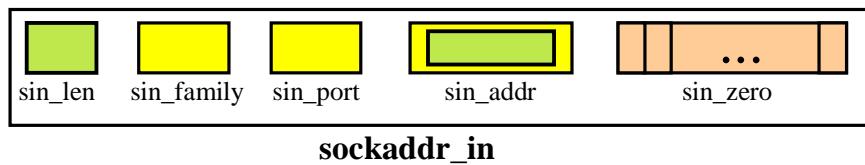
Forouzan Notes

COSC 6377 - Fall 2000

24-3

Figure 24-3

Socket address structure



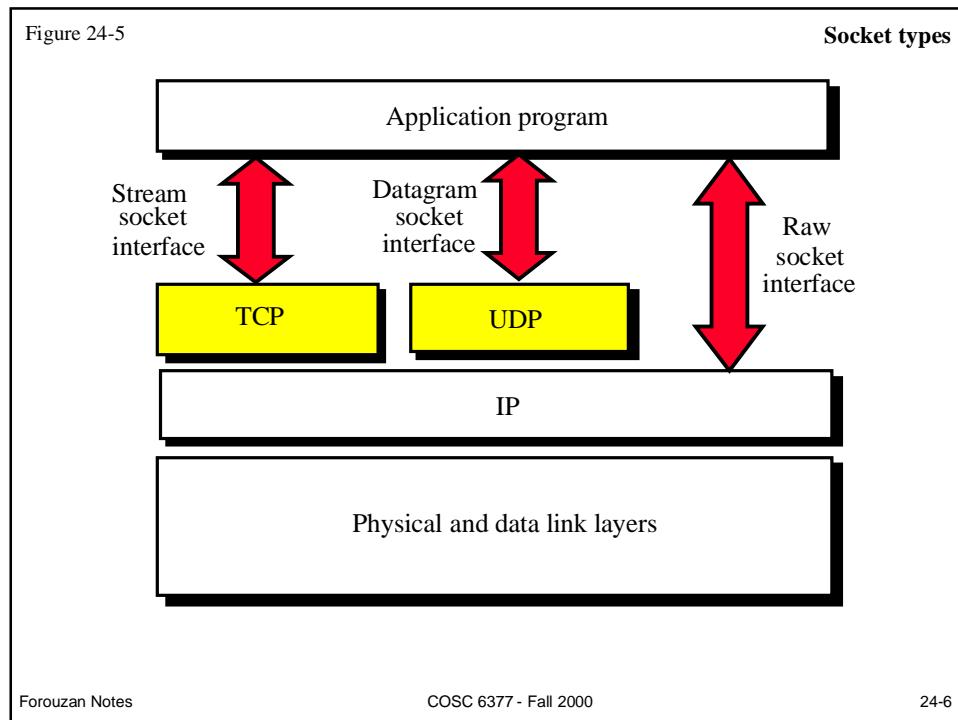
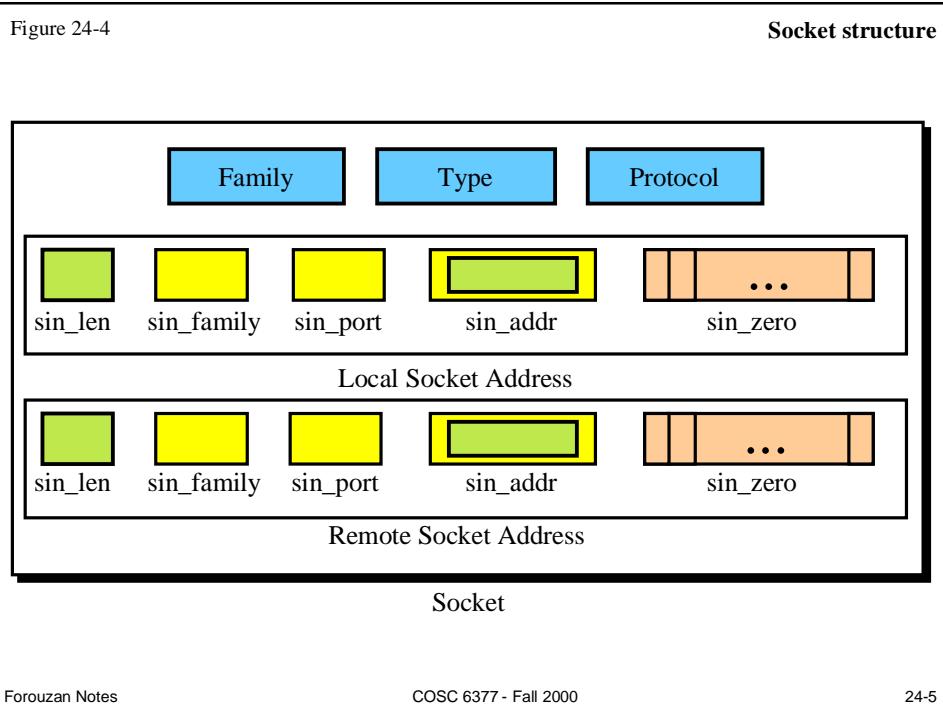
```
struct sockaddr_in  
{  
    u_char sin_len ;  
    u_short sin_family ;  
    u_short sin_port ;  
    struct in_addr sin_addr ;  
    char sin_zero [8] ;  
};
```

Forouzan Notes

COSC 6377 - Fall 2000

24-4

Slides from *TCP/IP* - Forouzan



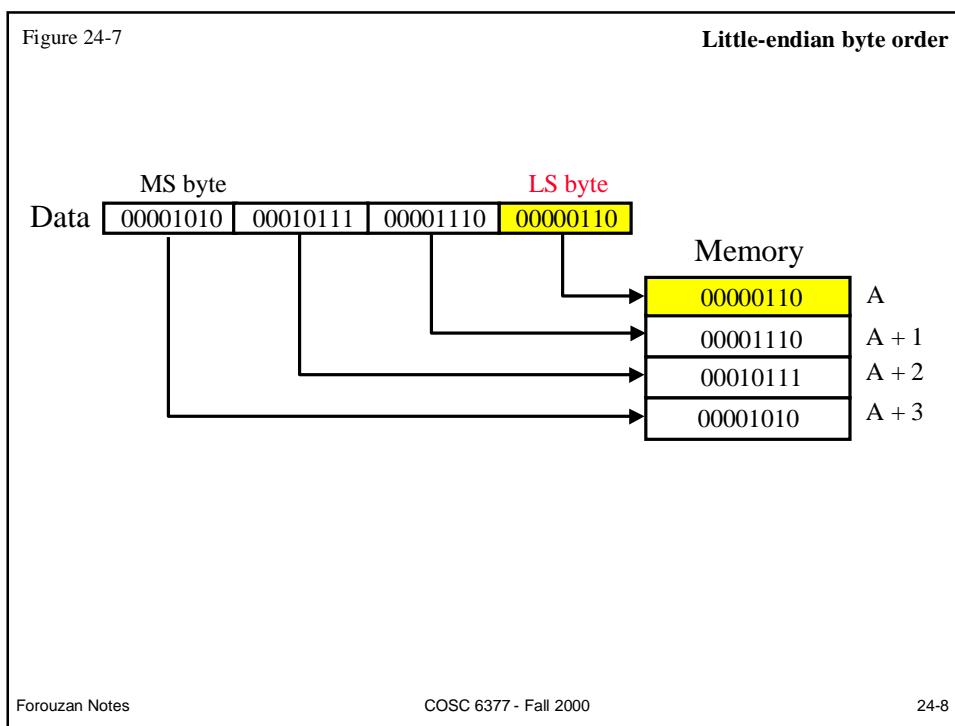
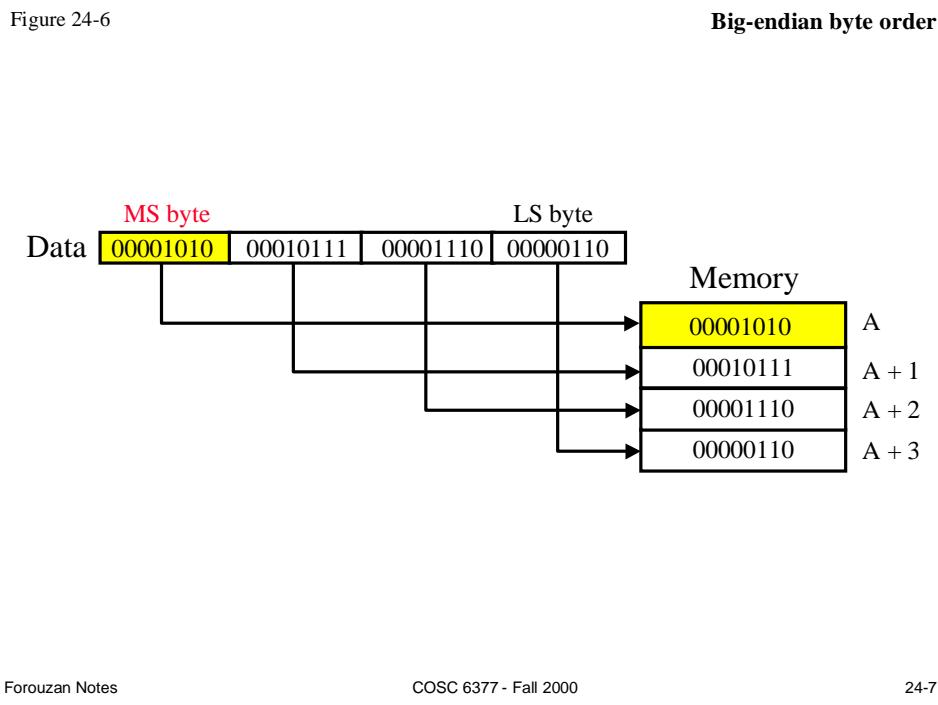
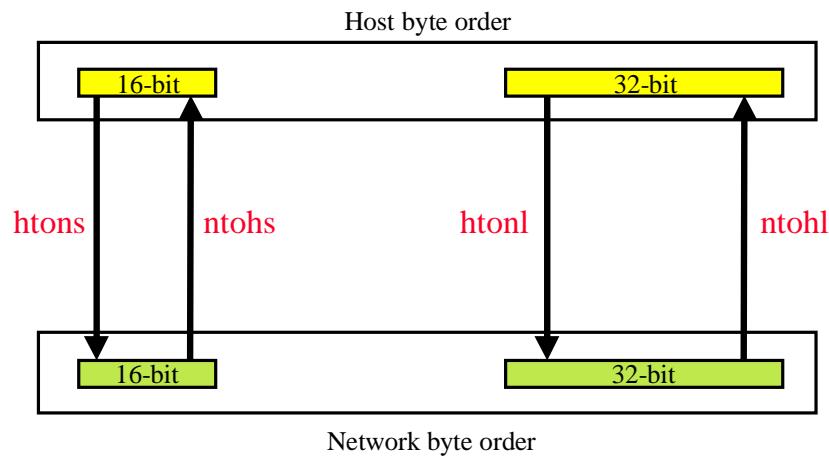


Figure 24-8

Byte-order transformation functions



Forouzan Notes

COSC 6377 - Fall 2000

24-9

Figure 24-9

Declarations for byte-order transformation

```

u_short    htons( u_short      host_short ) ;

u_short    ntohs( u_short      network_short ) ;

u_long     htonl( u_long      host_long ) ;

u_long     ntohl( u_long      network_long ) ;

```

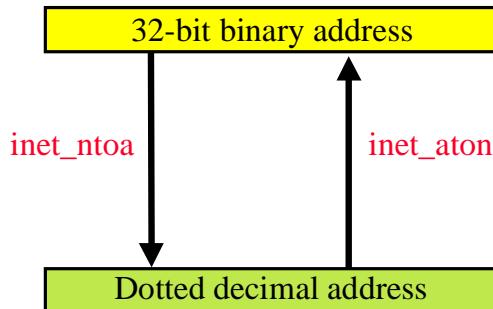
Forouzan Notes

COSC 6377 - Fall 2000

24-10

Figure 24-10

Address transformation



Forouzan Notes

COSC 6377 - Fall 2000

24-11

Figure 24-11

Declarations for transformation functions

```
int      inet_aton ( const char  *strptr , struct in_addr  *addrptr ) ;  
char    *inet_ntoa ( struct in_addr  inaddr ) ;
```

Forouzan Notes

COSC 6377 - Fall 2000

24-12

Slides from *TCP/IP* - Forouzan

Figure 24-12

Declaration for byte-manipulation functions

```
void *memset ( void *dest , int chr , int len ) ;  
  
void *memcpy ( void *dest , const void *src , int len ) ;  
  
int memcmp ( const void *first , const void *second , int len ) ;
```

Forouzan Notes

COSC 6377- Fall 2000

24-13

Figure 24-13

Declaration for gethostbyname

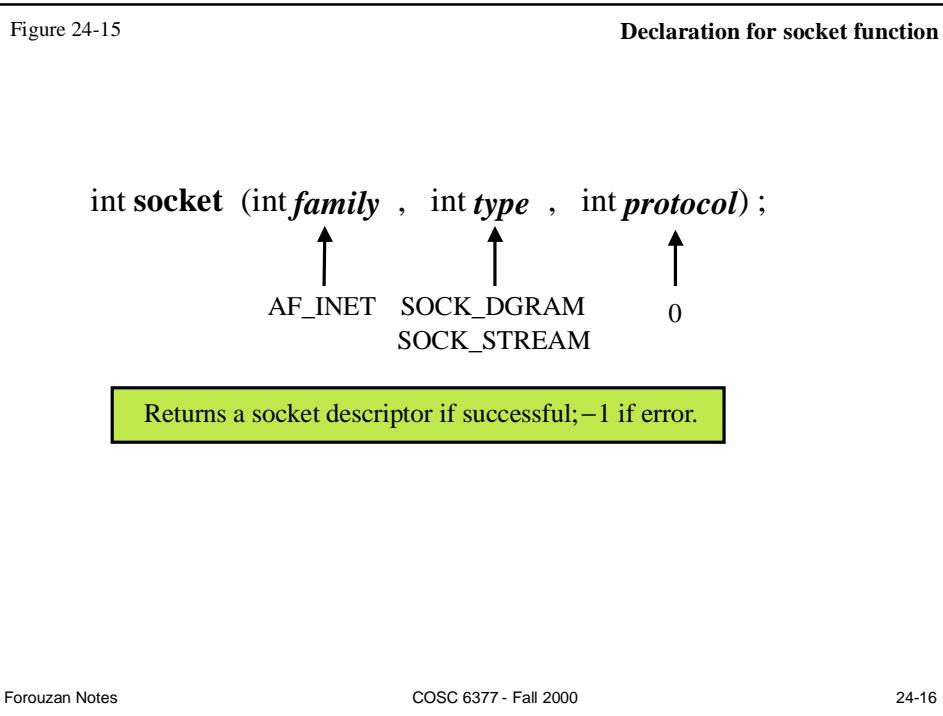
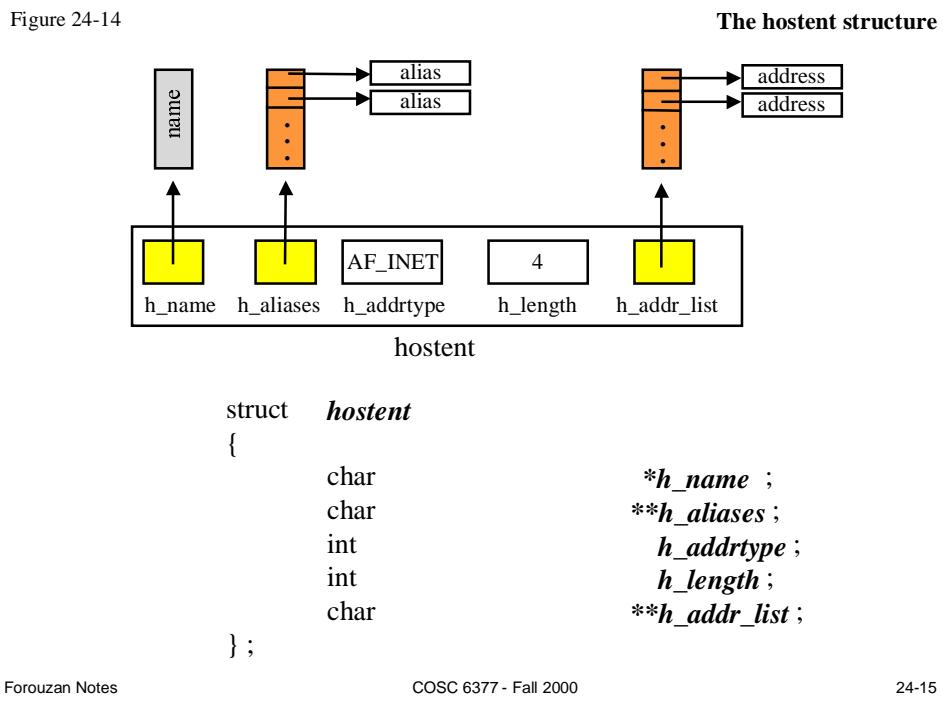
```
struct hostent *gethostbyname ( const char *hostname ) ;
```

Forouzan Notes

COSC 6377- Fall 2000

24-14

Slides from *TCP/IP* - Forouzan



Slides from *TCP/IP* - Forouzan

Figure 24-16

Declaration for bind function

```
int bind (int sockfd , const struct sockaddr_in *localaddr , int localaddrlen) ;
```

Returns 0 if successful; -1 if error.

Forouzan Notes

COSC 6377 - Fall 2000

24-17

Figure 24-17

Declaration for connect function

```
int connect (int sockfd , const struct sockaddr_in *serveraddr , int serveraddrlen) ;
```

Returns 0 if successful; -1 if error

Forouzan Notes

COSC 6377 - Fall 2000

24-18

Slides from *TCP/IP* - Forouzan

Figure 24-18

Declaration for listen function

```
int listen (int sockfd , int backlog) ;
```

Returns 0 if successful; - 1 if error

Forouzan Notes

COSC 6377 - Fall 2000

24-19

Figure 24-19

Declaration for accept function

```
int accept (int sockfd , const struct sockaddr_in *clientaddr , int *clientaddrlen) ;
```

Returns a socket descriptor if successful; - 1 if error

Forouzan Notes

COSC 6377 - Fall 2000

24-20

Slides from *TCP/IP* - Forouzan

Figure 24-20

Declaration for sendto function

```
int sendto (int sockfd , const void *buf , int buflen , int flags ,  
           const struct sockaddr_in *toaddr , int toaddrlen) ;
```

Returns number of bytes sent if successful; - 1 if error

Forouzan Notes

COSC 6377- Fall 2000

24-21

Figure 24-21

Declaration for recvfrom function

```
int recvfrom (int sockfd , const void *buf , int buflen , int flags ,  
               const struct sockaddr_in *fromaddr , int *fromaddrlen) ;
```

Returns number of bytes sent if successful; - 1 if error

Forouzan Notes

COSC 6377- Fall 2000

24-22

Slides from *TCP/IP* - Forouzan

Figure 24-22

Declaration for read function

```
int read (int sockfd , const void *buf , int buflen );
```

Returns number of bytes read if successful; 0 for end of file;-1 if error.

Forouzan Notes

COSC 6377 - Fall 2000

24-23

Figure 24-23

Declaration for write function

```
int write (int sockfd , const void *buf , int buflen );
```

Returns number of bytes written if successful;-1 if error.

Forouzan Notes

COSC 6377 - Fall 2000

24-24

Figure 24-24

Declaration for close function

```
int close (int sockfd );
```

Returns 0 if successful; -1 if error

Forouzan Notes

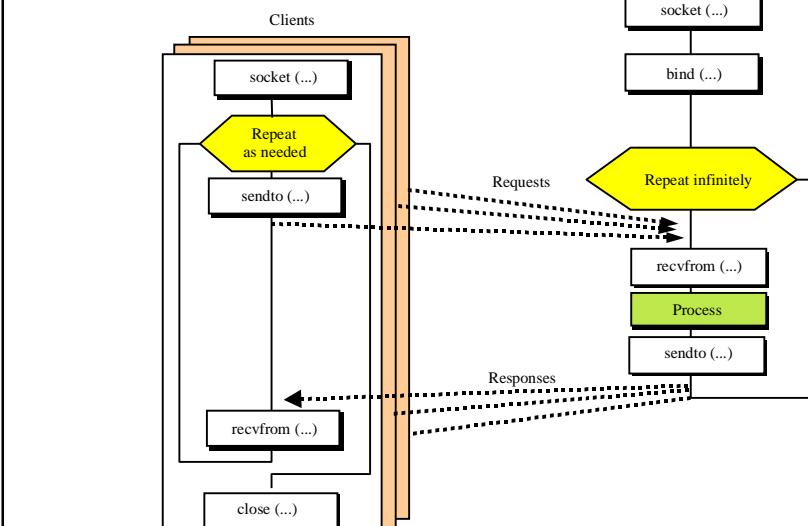
COSC 6377 - Fall 2000

24-25

Figure 24-25

Socket interface for connectionless iterative server

Each server serves many clients
but handles one request at a time.
Requests from different clients
can be mingled together.



Forouzan Notes

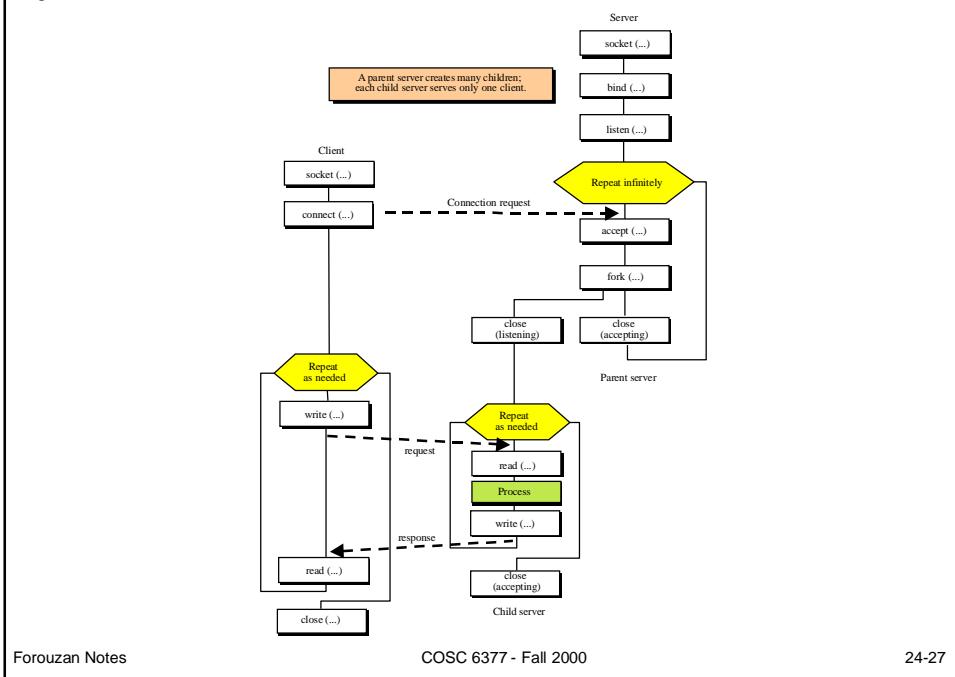
COSC 6377 - Fall 2000

24-26

Slides from *TCP/IP* - Forouzan

Figure 24-26

Socket interface for connection-oriented concurrent server



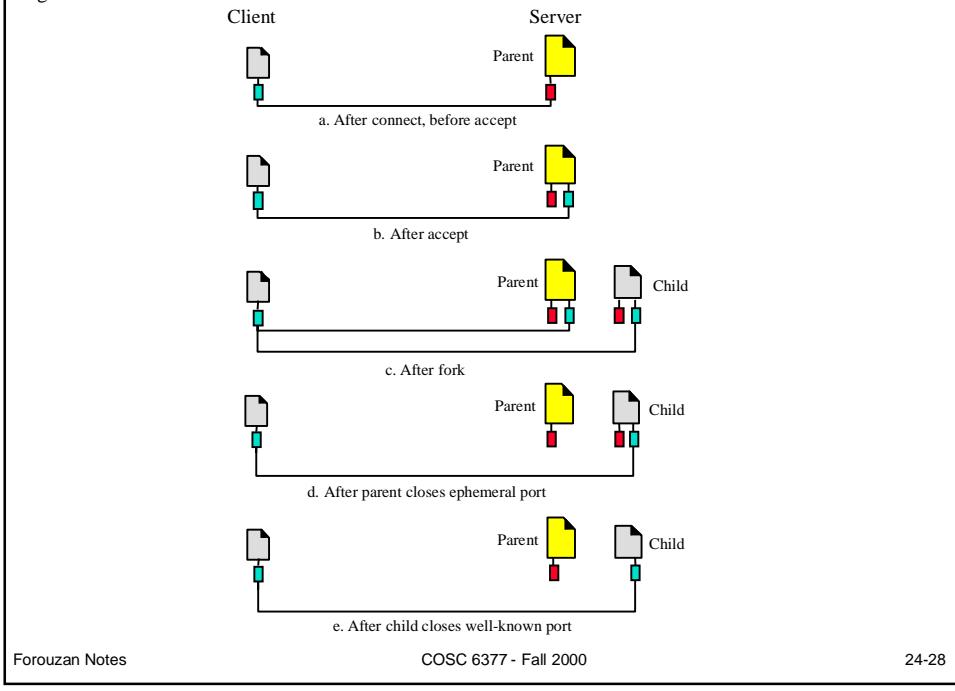
Forouzan Notes

COSC 6377 - Fall 2000

24-27

Figure 24-27

Relationship between the client and the server



Forouzan Notes

COSC 6377 - Fall 2000

24-28