

- Programação socket – Conversão entre formatos

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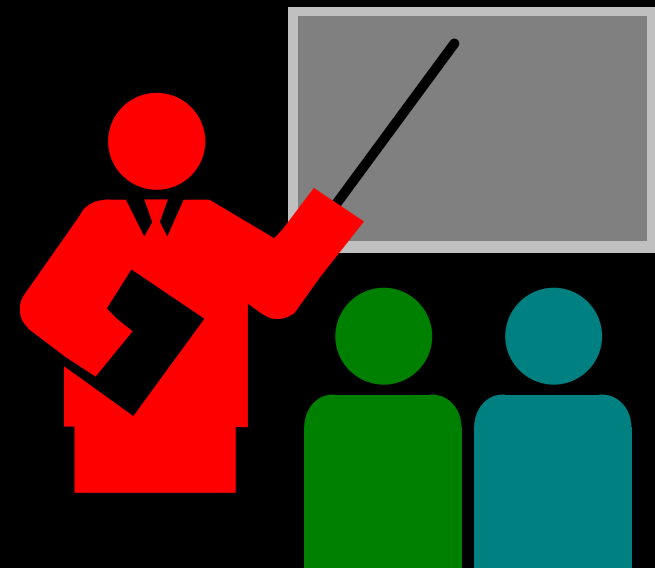
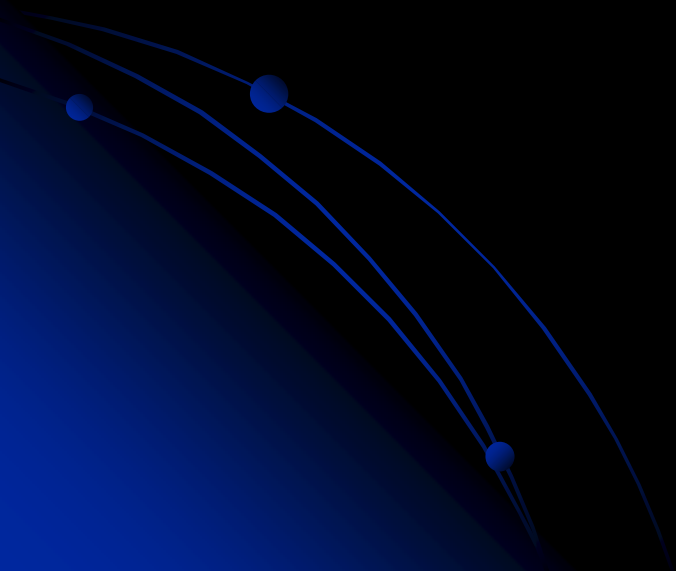
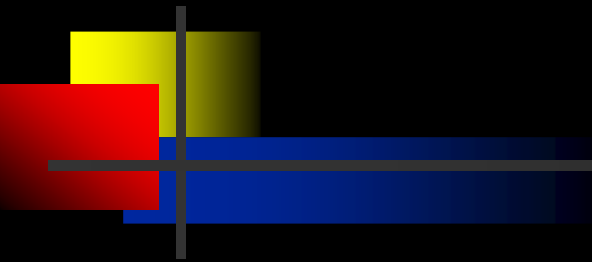
Agenda

- **Formatos**

- **Conversão entre formatos**
 - ❖ Conversão de Short Integer
 - ❖ Conversão de Long Integer
 - ❖ Conversão de Endereço IP

- **Exemplo de utilidade**

Formatos

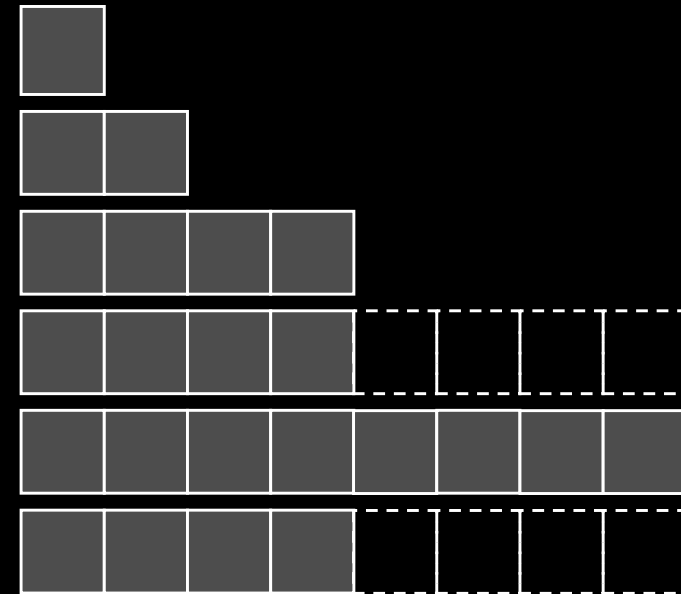


Formatos

Formatos na linguagem C

	Operação 32 bits (ILP 32)	Operação 64 bits (LP 64)
char	8 bits	8 bits
short int	16 bits	16 bits
int	32 bits	32 bits
long int	32 bits	64 bits
long long int	64 bits	64 bits
ponteiro	32 bits	64 bits

Comparação



Formato

❑ Formato de endereço IPv4

❖ Formato string pointer

- char stringIP[16]

- formato

N	N	N	.	N	N	N	.	N	N	N	.	N	N	N	\0
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	----

- exemplo

1	4	3	.	1	0	7	.	8	3	.	1	0	0	\0
---	---	---	---	---	---	---	---	---	---	---	---	---	---	----

❖ Formato sequencia de 4 bytes

- unsigned short int ip[4]

- formato

N	N	N	N
---	---	---	---

- exemplo

143	107	99	100
-----	-----	----	-----

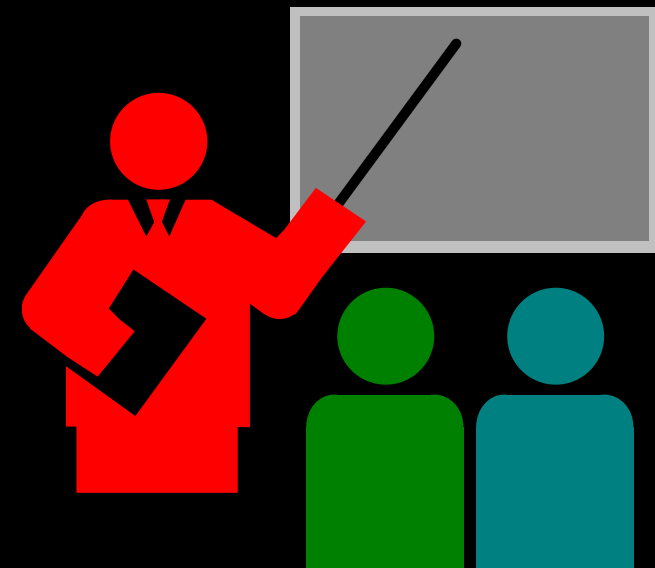
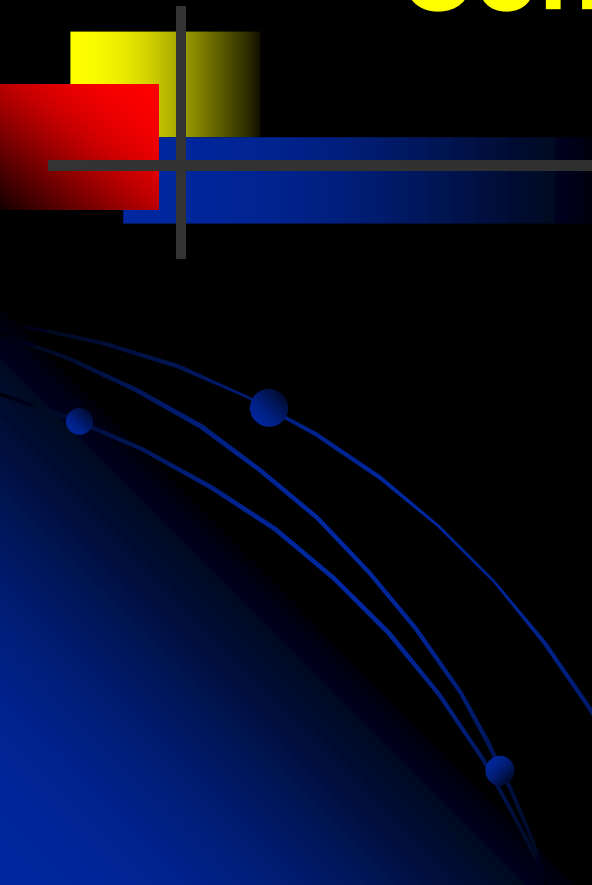
Formatos

- **Ordem dos bytes na representação dos objetos**
 - ❖ **Objetos: valores inteiros, endereço IP, ...**

 - ❖ **Host byte order**
 - Ordem utilizado pela arquitetura do host

 - ❖ **Network byte order**
 - Ordem utilizado pela infraestrutura de rede

Conversão entre formatos



Conversão entre formatos

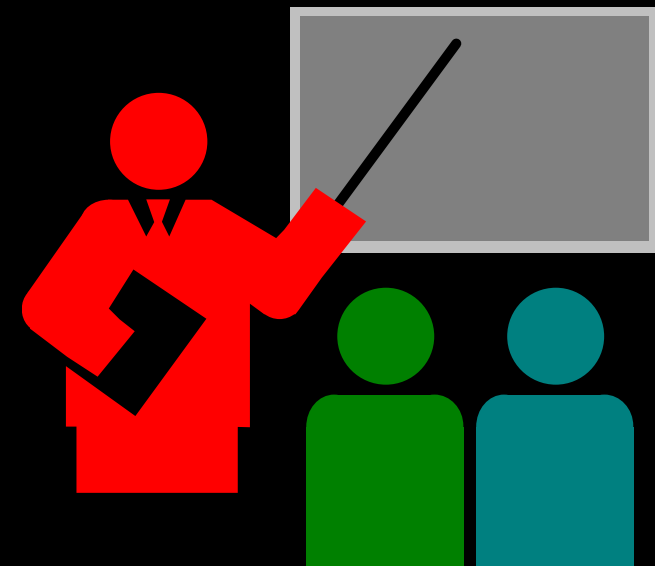
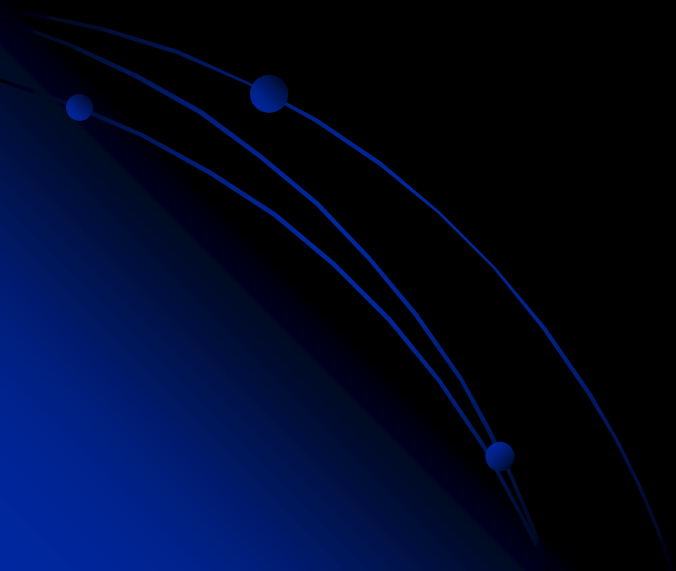
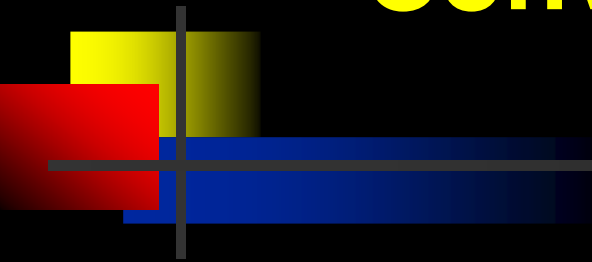
□ Resumo das funções:

long integer (32 bits)	h → n n → h	htonl() ntohl()
short integer (16 bits)	h → n n → h	htons() ntohs()
endereço (IP)	p → n n → p	inet_pton() inet_ntop()

n	network byte order
h	host byte order
p	string pointer

s	short integer (16 bits)
l	long integer (32 bits)
inet	endereço internet (IP)

Conversão de Short Integer



Conversão de Short Integer

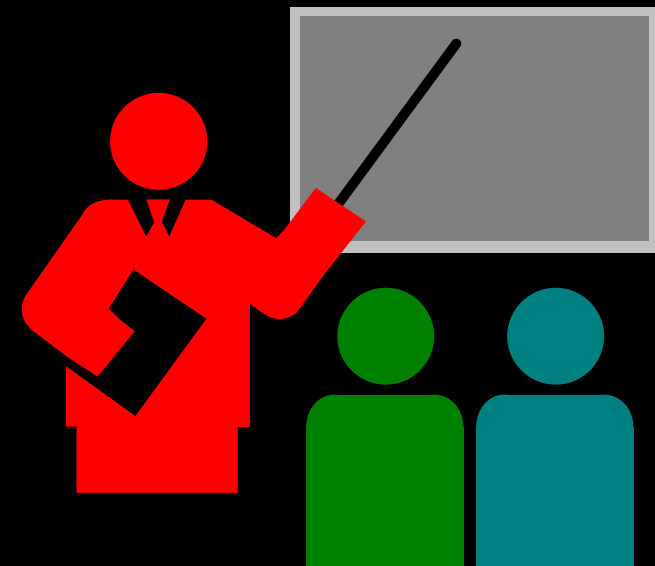
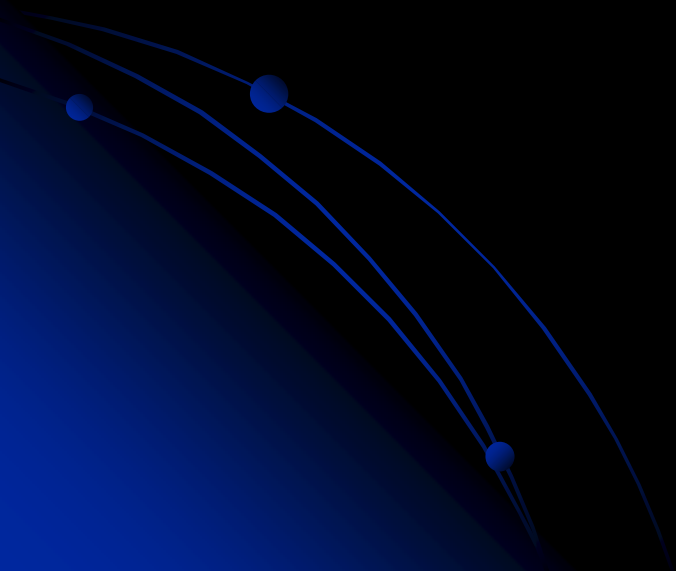
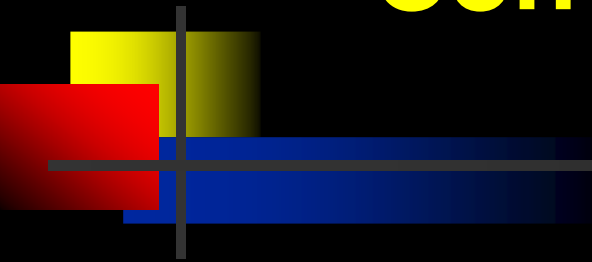
- ❑ Funções de conversão de *short integer* (inteiro de 16 bits)
 - ❖ htons
 - ❖ ntohs

- ❑ Significado
 - ❖ h *host byte order*
 - ❖ to para
 - ❖ n *network byte order*
 - ❖ s *short integer* (inteiro de 16 bits)

- ❑ Sintaxe

```
#include <netinet/in.h>
unsigned short int htons(unsigned short int)
unsigned short int ntohs(unsigned short int)
```

Conversão de Long Integer



Conversão de Long Integer

❑ Funções de conversão de *long integer* (inteiro de 32 bits)

- ❖ htonl
- ❖ ntohl

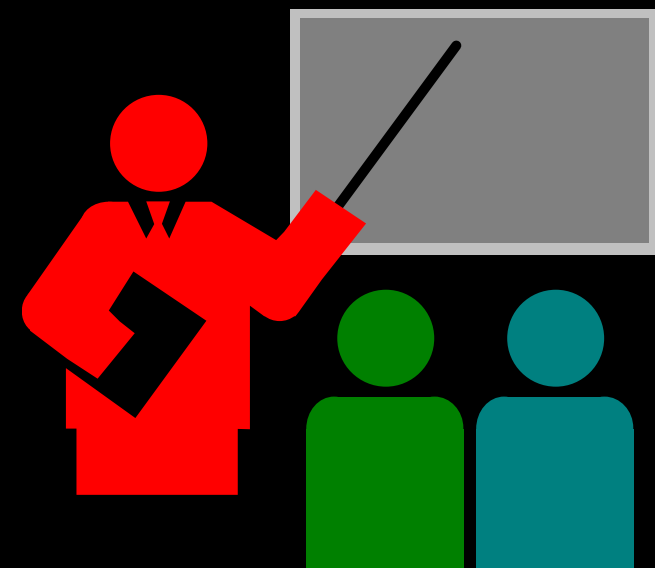
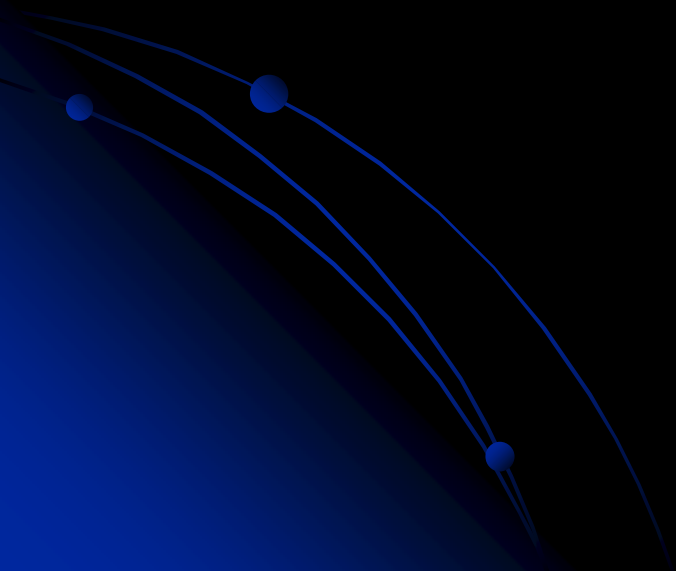
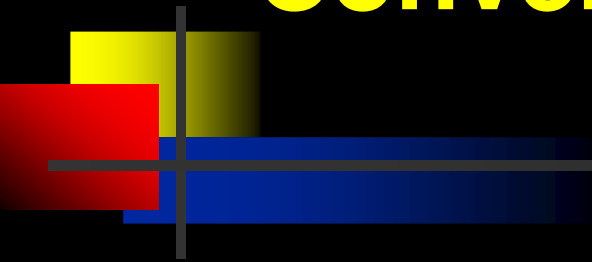
❑ Significado

- ❖ h *host byte order*
- ❖ to para
- ❖ n *network byte order*
- ❖ l *long integer* (processador de 32 bits → 32 bits)

❑ Sintaxe

```
#include <netinet/in.h>
unsigned long int htonl(unsigned long int)
unsigned long int ntohl(unsigned long int)
```

Conversão de endereço de rede



Conversão de endereço de rede

❑ Funções de conversão de endereço internet (IP)

- ❖ `inet_pton`
- ❖ `inet_ntop`

❑ Significado

- ❖ `n` *network byte order*
- ❖ `to` *para*
- ❖ `p` *string pointer*
- ❖ `inet` *endereço internet (Internet Protocol)*

❑ Sintaxe

```
#include <sys/types.h>
#include <sys/socket.h>
#include <arpa/inet.h>
int     inet_pton(int af, char *src, void *dst)
char *inet_ntop(int af, void *src, char *buf, int bufsize)
```

Conversão de endereço de rede

- “IP string” (p) → “IP network byte order (in-addr)” (n)

```
int inet_pton(int af, char *src, void *dst)
```

af : address family (utilizar AF_INET)

src : ponteiro para endereço IP no formato string (aaa.bbb.ccc.ddd)

dst : ponteiro para estrutura in-addr

- “IP network byteorder (in-addr)” (n) → “IP-string” (p)

```
char * inet_ntop(int af, void *src, char *buf, int bufsize)
```

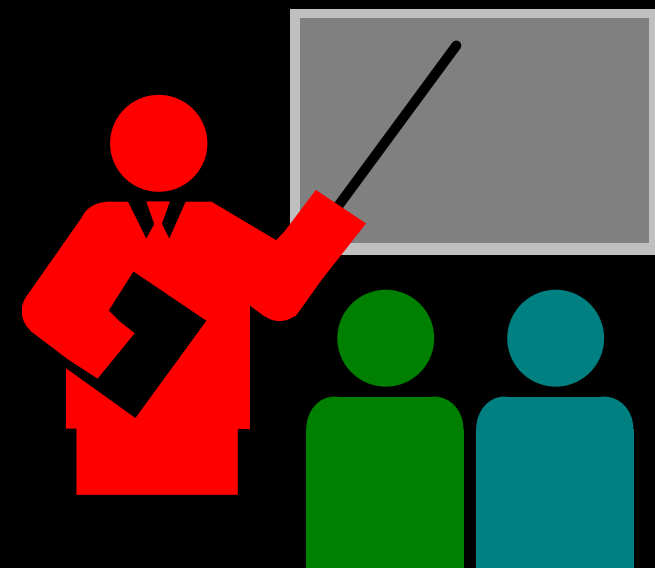
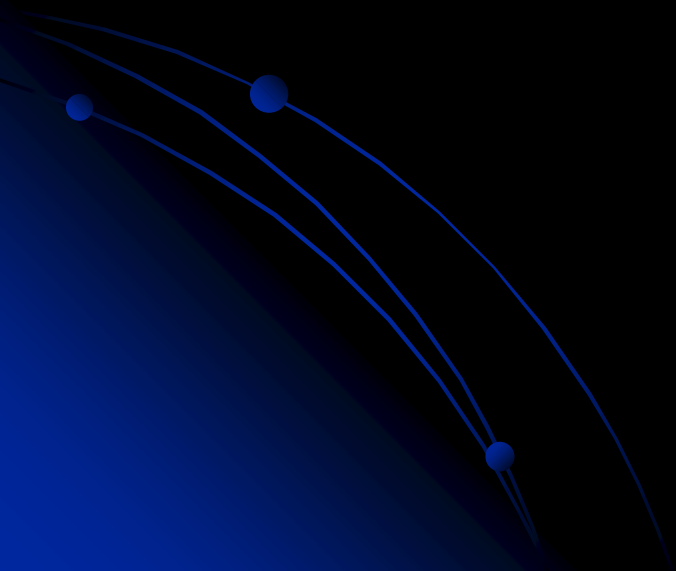
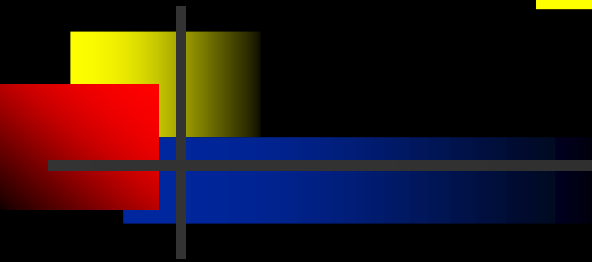
af : address family (utilizar AF_INET)

src : ponteiro para estrutura in_addr

buf : buffer no qual será armazenada a string IP

bufsize : tamanho do buffer

Exemplo de utilidade



Exemplo de utilidade

- Iniciação da estrutura “sockaddr_in”

```
struct sockaddr_in
```

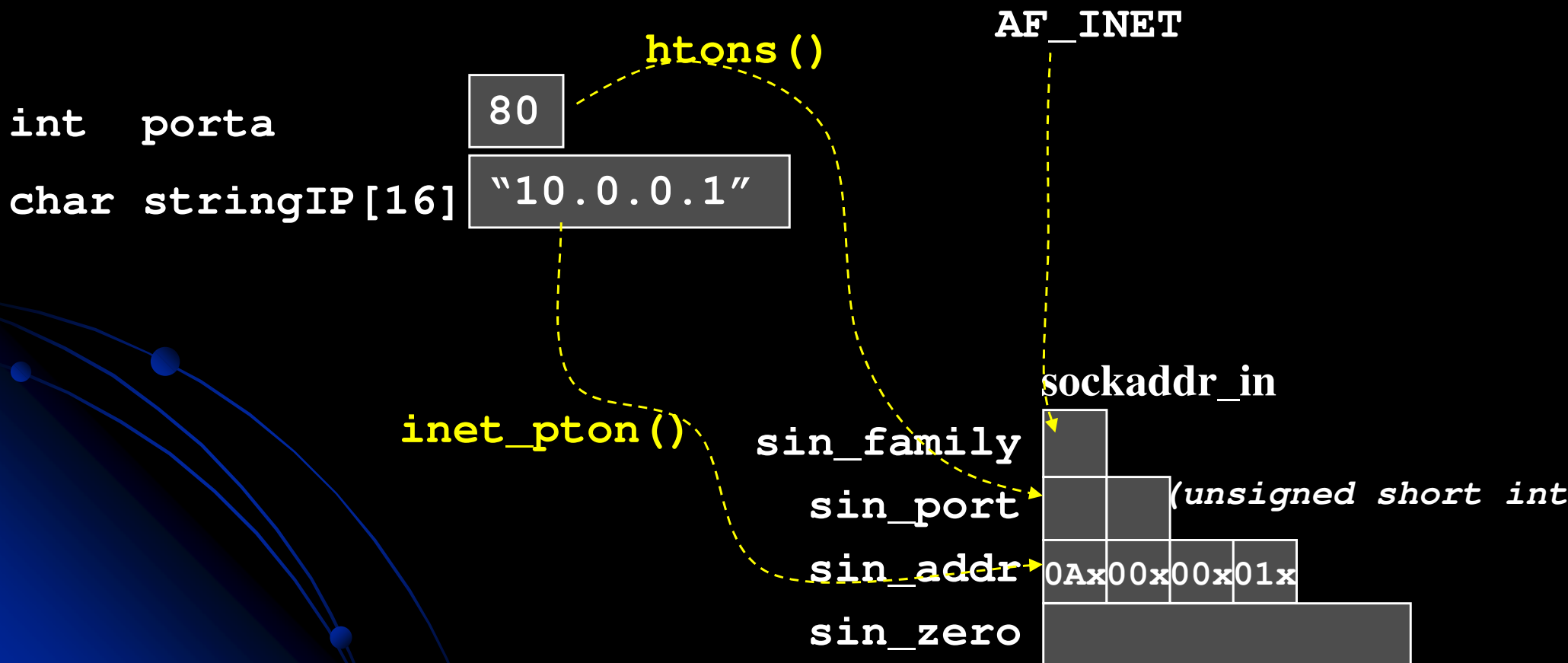
```
{  
    u_short  sin_family;  
    u_short  sin_port; ←  
    u_long   sin_addr ←  
    char     sin_zero[8];  
}
```

short integer

*Endereço IP em
network byte order
(4 bytes)*

Exemplo de utilidade

- Iniciação da estrutura "sockaddr_in"



Exemplo de utilidade

□ Iniciação da estrutura “sockaddr_in”

