Algorithms

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3.4 Linear Probing Demo

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3.4 Linear Probing Demo

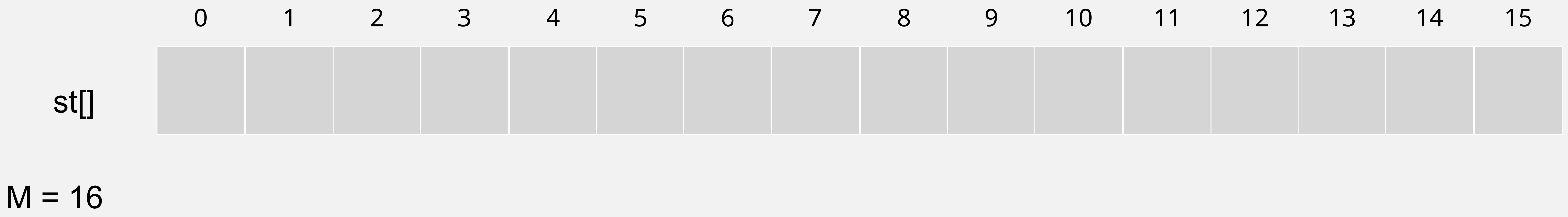
- *insert*
- *search*

Linear-probing hash table demo: insert

Hash. Map key to integer i between 0 and M-1.

Insert. Put at table index i if free; if not try i+1, i+2, etc.

linear-probing hash table



0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

st[]

M = 16

Linear-probing hash table demo: insert

Hash. Map key to integer i between 0 and M-1.

Insert. Put at table index i if free; if not try i+1, i+2, etc.

insert S

hash(S) = 6

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]																

M = 16

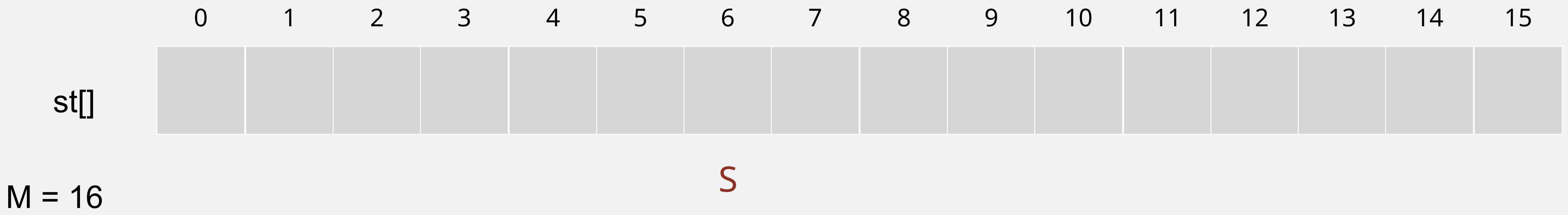
Linear-probing hash table demo: insert

Hash. Map key to integer i between 0 and M-1.

Insert. Put at table index i if free; if not try i+1, i+2, etc.

insert S

hash(S) = 6



Linear-probing hash table demo: insert

Hash. Map key to integer i between 0 and M-1.

Insert. Put at table index i if free; if not try i+1, i+2, etc.

insert S

hash(S) = 6

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]							S									

M = 16

Linear-probing hash table demo: insert

Hash. Map key to integer i between 0 and M-1.

Insert. Put at table index i if free; if not try i+1, i+2, etc.

linear-probing hash table

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]							S									

M = 16

Linear-probing hash table demo: insert

Hash. Map key to integer i between 0 and M-1.

Insert. Put at table index i if free; if not try i+1, i+2, etc.

insert E

hash(E) = 10

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]							S									

M = 16

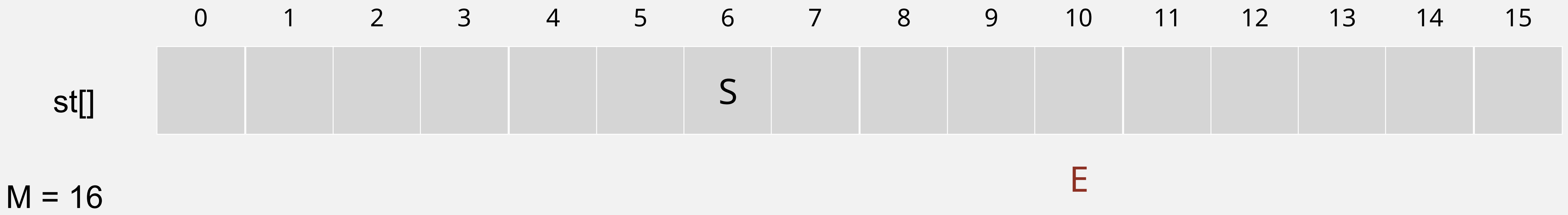
Linear-probing hash table demo: insert

Hash. Map key to integer i between 0 and M-1.

Insert. Put at table index i if free; if not try i+1, i+2, etc.

insert E

hash(E) = 10



	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]							S									
											E					

M = 16

Linear-probing hash table demo: insert

Hash. Map key to integer i between 0 and M-1.

Insert. Put at table index i if free; if not try i+1, i+2, etc.

insert E

hash(E) = 10

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]							S				E					

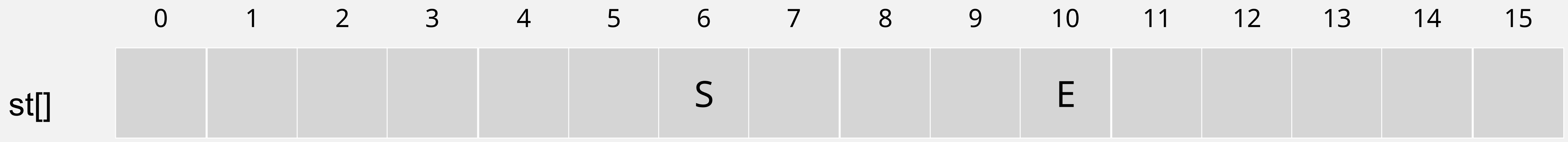
M = 16

Linear-probing hash table demo: insert

Hash. Map key to integer i between 0 and M-1.

Insert. Put at table index i if free; if not try i+1, i+2, etc.

linear-probing hash table



	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]							S				E					

M = 16

Linear-probing hash table demo: insert

Hash. Map key to integer i between 0 and M-1.

Insert. Put at table index i if free; if not try i+1, i+2, etc.

insert A

hash(A) = 4

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]							S				E					

M = 16

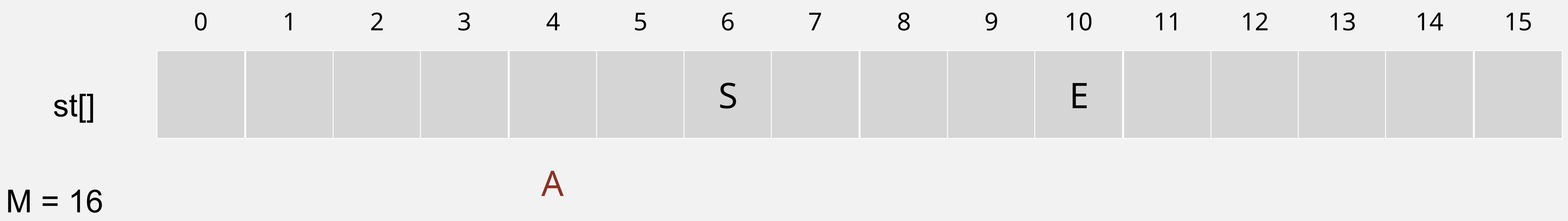
Linear-probing hash table demo: insert

Hash. Map key to integer i between 0 and M-1.

Insert. Put at table index i if free; if not try i+1, i+2, etc.

insert A

hash(A) = 4



	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]							S				E					
					A											

M = 16

Linear-probing hash table demo: insert

Hash. Map key to integer i between 0 and M-1.

Insert. Put at table index i if free; if not try i+1, i+2, etc.

insert A

hash(A) = 4

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]					A		S				E					

M = 16

Linear-probing hash table demo: insert

Hash. Map key to integer i between 0 and M-1.

Insert. Put at table index i if free; if not try i+1, i+2, etc.

linear-probing hash table

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]					A		S				E					

M = 16

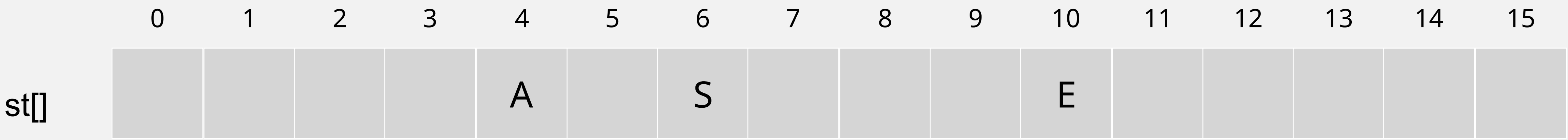
Linear-probing hash table demo: insert

Hash. Map key to integer i between 0 and M-1.

Insert. Put at table index i if free; if not try i+1, i+2, etc.

insert R

hash(R) = 14



	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]					A		S				E					

M = 16

Linear-probing hash table demo: insert

Hash. Map key to integer i between 0 and M-1.

Insert. Put at table index i if free; if not try i+1, i+2, etc.

insert R

hash(R) = 14

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]					A		S				E					
															R	

M = 16

Linear-probing hash table demo: insert

Hash. Map key to integer i between 0 and M-1.

Insert. Put at table index i if free; if not try i+1, i+2, etc.

insert R

hash(R) = 14

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]					A		S				E				R	

M = 16

Linear-probing hash table demo: insert

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Insert. Put at table index i if free; if not try i+1, i+2, etc.

linear-probing hash table

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]					A		S				E				R	

M = 16

Linear-probing hash table demo: insert

Hash. Map key to integer i between 0 and M-1.

Insert. Put at table index i if free; if not try i+1, i+2, etc.

insert C

hash(C) = 5

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]					A		S				E				R	

M = 16

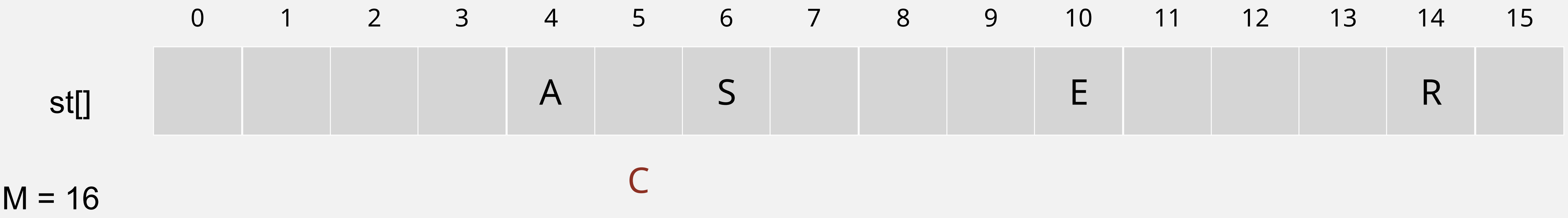
Linear-probing hash table demo: insert

Hash. Map key to integer i between 0 and M-1.

Insert. Put at table index i if free; if not try i+1, i+2, etc.

insert C

hash(C) = 5



	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]					A		S				E				R	
						C										

M = 16

Linear-probing hash table demo: insert

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Insert. Put at table index i if free; if not try i+1, i+2, etc.

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hash(C) = 5

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]					A	C	S				E				R	

M = 16

Linear-probing hash table demo: insert

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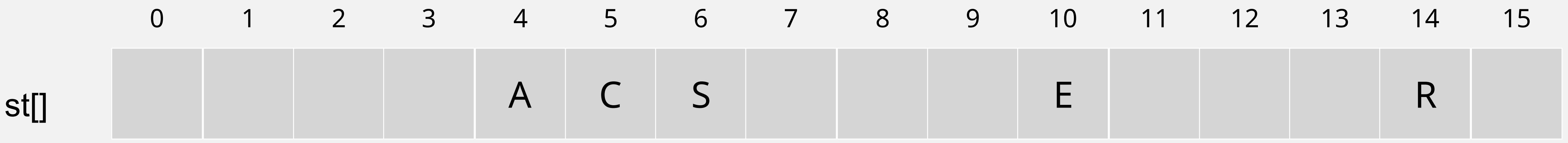
linear-probing hash table



	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]					A	C	S				E				R	

M = 16

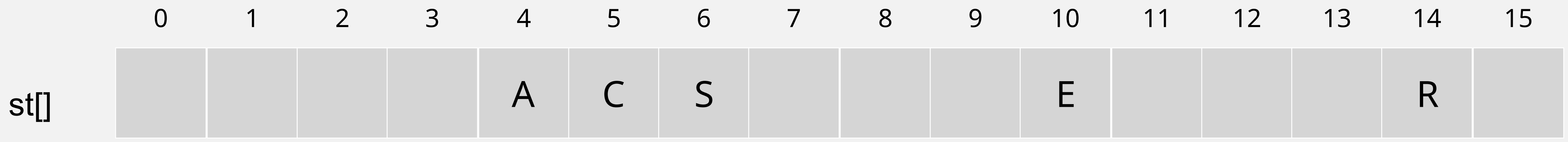
Linear-probing hash table demo: insert

Hash. Map key to integer i between 0 and M-1.

Insert. Put at table index i if free; if not try i+1, i+2, etc.

insert H

hash(H) = 4



	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]					A	C	S				E				R	

M = 16

Linear-probing hash table demo: insert

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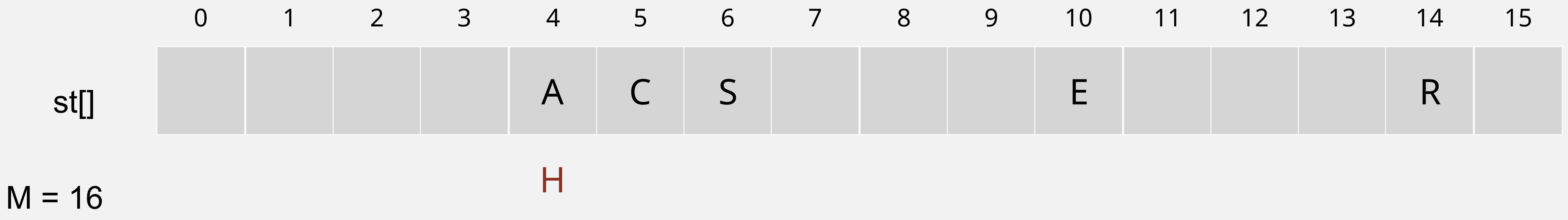
Insert. Put at table index i if free; if not try i+1, i+2, etc.

insert H

hash(H) = 4



	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]					A	C	S				E				R	
					H											

M = 16

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Insert. Put at table index i if free; if not try i+1, i+2, etc.

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	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]					A	C	S				E				R	
						H										

M = 16

Linear-probing hash table demo: insert

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	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]					A	C	S				E				R	
							H									

M = 16

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Insert. Put at table index i if free; if not try i+1, i+2, etc.

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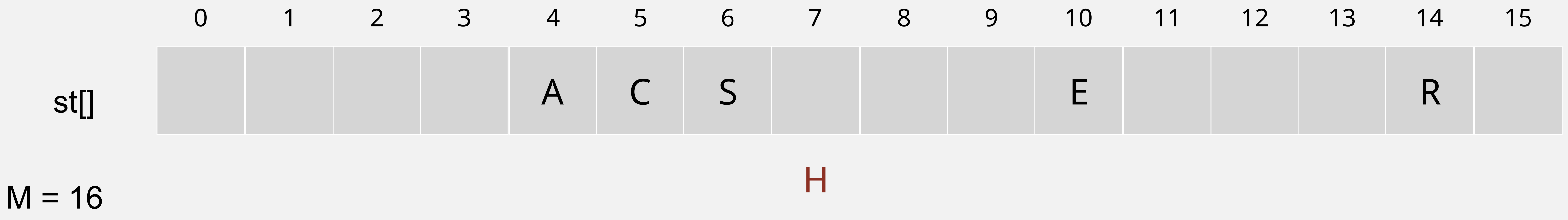
hash(H) = 4



	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]					A	C	S				E				R	
								H								

M = 16

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Insert. Put at table index i if free; if not try i+1, i+2, etc.

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	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]					A	C	S	H			E				R	

M = 16

Linear-probing hash table demo: insert

Hash. Map key to integer i between 0 and M-1.

Insert. Put at table index i if free; if not try i+1, i+2, etc.

linear-probing hash table

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]					A	C	S	H			E				R	

M = 16

Linear-probing hash table demo: insert

Hash. Map key to integer i between 0 and M-1.

Insert. Put at table index i if free; if not try i+1, i+2, etc.

insert X

hash(X) = 15

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]					A	C	S	H			E				R	

M = 16

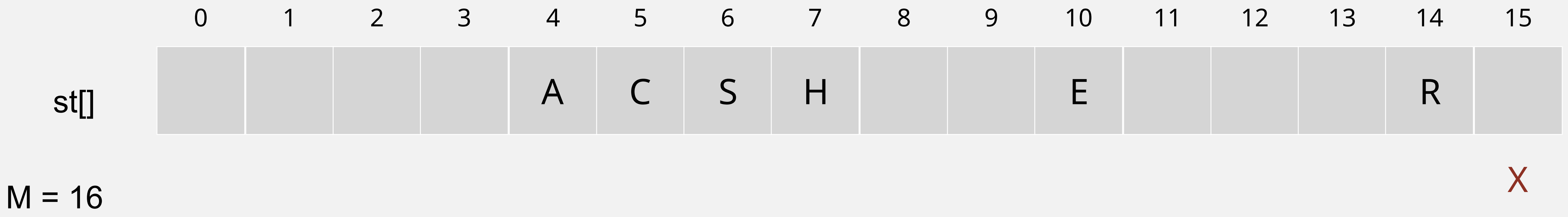
Linear-probing hash table demo: insert

Hash. Map key to integer i between 0 and M-1.

Insert. Put at table index i if free; if not try i+1, i+2, etc.

insert X

hash(X) = 15



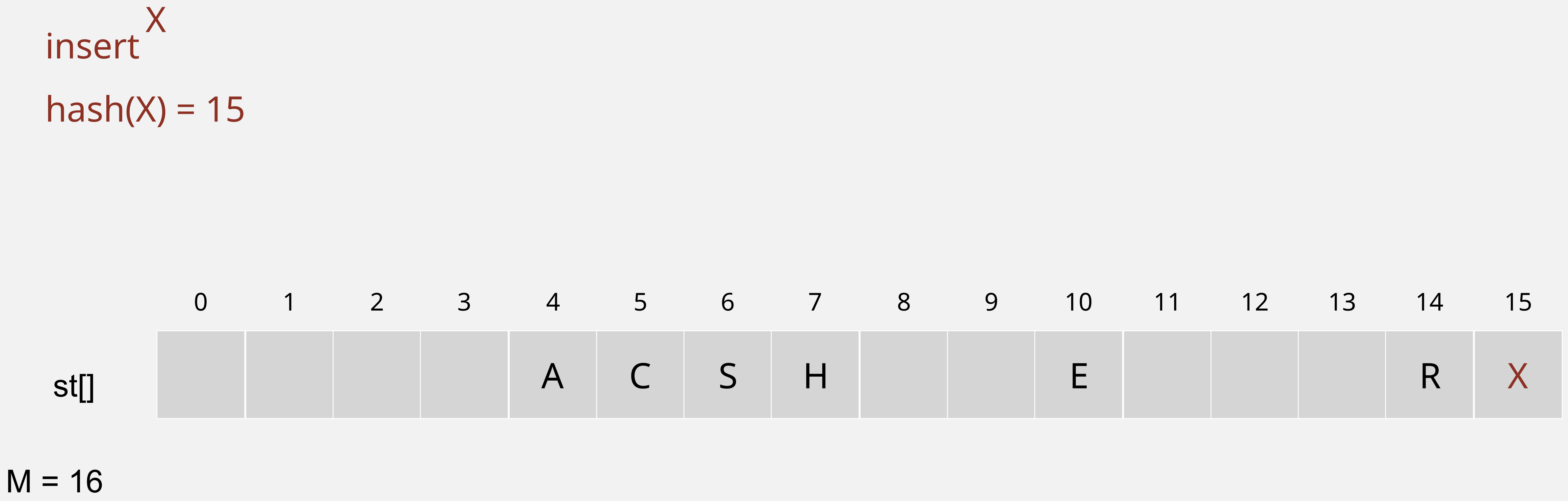
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]					A	C	S	H			E				R	
																X

M = 16

Linear-probing hash table demo: insert

Hash. Map key to integer i between 0 and M-1.

Insert. Put at table index i if free; if not try i+1, i+2, etc.



insert X

hash(X) = 15

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]					A	C	S	H			E				R	X

M = 16

Linear-probing hash table demo: insert

Hash. Map key to integer i between 0 and M-1.

Insert. Put at table index i if free; if not try i+1, i+2, etc.

linear-probing hash table

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]					A	C	S	H			E				R	X

M = 16

Linear-probing hash table demo: insert

Hash. Map key to integer i between 0 and M-1.

Insert. Put at table index i if free; if not try i+1, i+2, etc.

insert M

hash(M) = 1

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]					A	C	S	H			E				R	X

M = 16

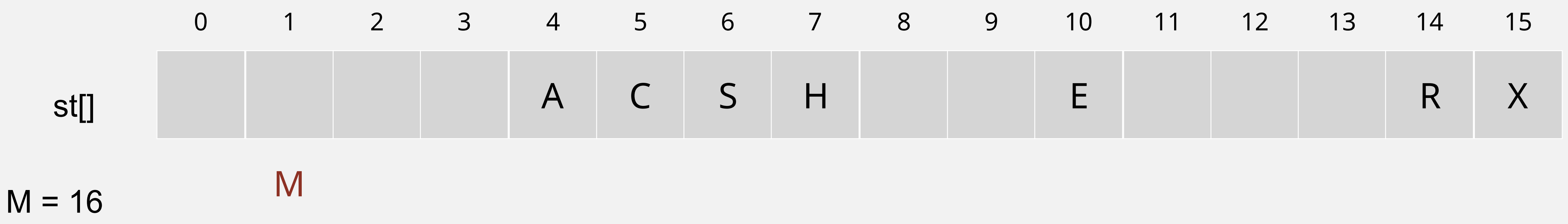
Linear-probing hash table demo: insert

Hash. Map key to integer i between 0 and M-1.

Insert. Put at table index i if free; if not try i+1, i+2, etc.

insert M

hash(M) = 1



	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]					A	C	S	H			E				R	X
M = 16		M														

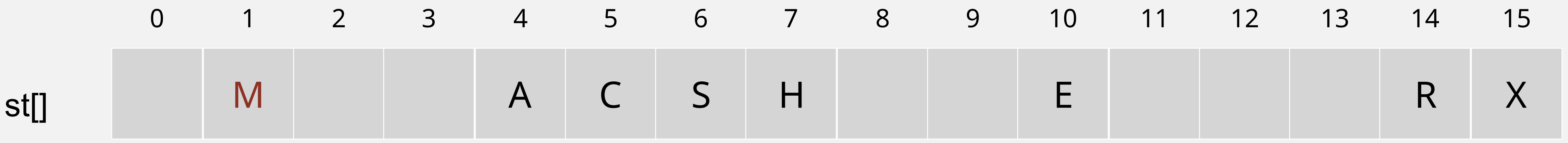
Linear-probing hash table demo: insert

Hash. Map key to integer i between 0 and M-1.

Insert. Put at table index i if free; if not try i+1, i+2, etc.

insert M

hash(M) = 1



	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]		M			A	C	S	H			E				R	X

M = 16

Linear-probing hash table demo: insert

Hash. Map key to integer i between 0 and M-1.

Insert. Put at table index i if free; if not try i+1, i+2, etc.

linear-probing hash table

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]		M			A	C	S	H			E				R	X

M = 16

Linear-probing hash table demo: insert

Hash. Map key to integer i between 0 and M-1.

Insert. Put at table index i if free; if not try i+1, i+2, etc.

insert P

hash(P) = 14

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]		M			A	C	S	H			E				R	X

M = 16

Linear-probing hash table demo: insert

Hash. Map key to integer i between 0 and M-1.

Insert. Put at table index i if free; if not try i+1, i+2, etc.

insert P

hash(P) = 14

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]		M			A	C	S	H			E				R	X
															P	

M = 16

Linear-probing hash table demo: insert

Hash. Map key to integer i between 0 and M-1.

Insert. Put at table index i if free; if not try i+1, i+2, etc.

insert P

hash(P) = 14

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]		M			A	C	S	H			E				R	X
M = 16	P															P

Linear-probing hash table demo: insert

Hash. Map key to integer i between 0 and M-1.

Insert. Put at table index i if free; if not try i+1, i+2, etc.

insert P

hash(P) = 14

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]	P	M			A	C	S	H			E				R	X

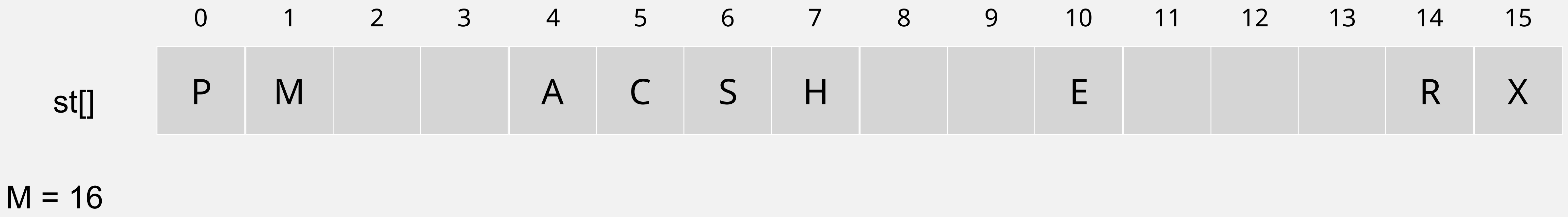
M = 16

Linear-probing hash table demo: insert

Hash. Map key to integer i between 0 and M-1.

Insert. Put at table index i if free; if not try i+1, i+2, etc.

linear-probing hash table



	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]	P	M			A	C	S	H			E				R	X

M = 16

Linear-probing hash table demo: insert

Hash. Map key to integer i between 0 and M-1.

Insert. Put at table index i if free; if not try i+1, i+2, etc.

insert L

hash(L) = 6

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]	P	M			A	C	S	H			E				R	X

M = 16

Linear-probing hash table demo: insert

Hash. Map key to integer i between 0 and M-1.

Insert. Put at table index i if free; if not try i+1, i+2, etc.

insert L

hash(L) = 6

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]	P	M			A	C	S	H			E				R	X
							L									

M = 16

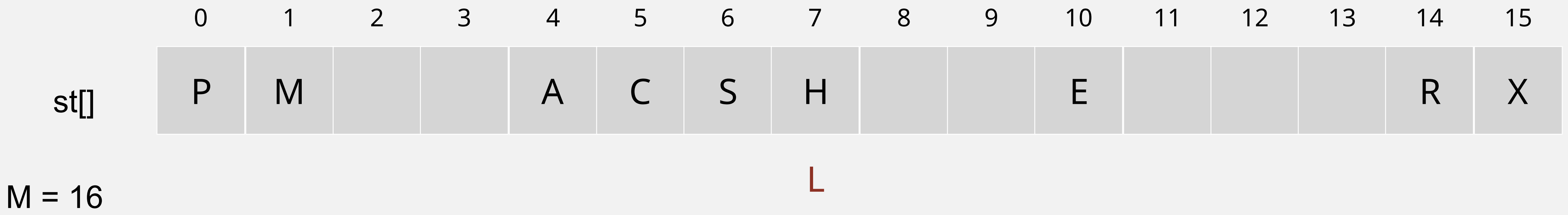
Linear-probing hash table demo: insert

Hash. Map key to integer i between 0 and M-1.

Insert. Put at table index i if free; if not try i+1, i+2, etc.

insert L

hash(L) = 6



	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]	P	M			A	C	S	H			E				R	X
								L								

M = 16

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Insert. Put at table index i if free; if not try i+1, i+2, etc.

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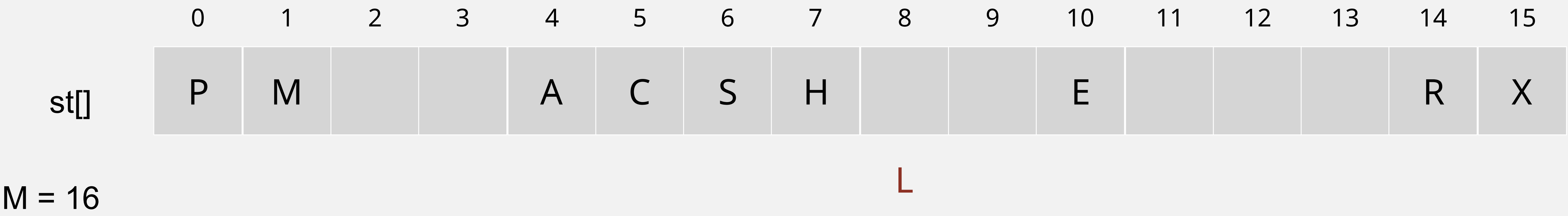
hash(L) = 6



	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]	P	M			A	C	S	H			E				R	X
									L							

M = 16

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Insert. Put at table index i if free; if not try i+1, i+2, etc.

insert L

hash(L) = 6

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]	P	M			A	C	S	H	L		E				R	X

M = 16

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Insert. Put at table index i if free; if not try i+1, i+2, etc.

linear-probing hash table

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]	P	M			A	C	S	H	L		E				R	X

M = 16

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3.4 Linear Probing Demo

- *insert*
- *search*

Linear-probing hash table demo: search

Hash. Map key to integer i between 0 and M-1.

Search. Search table index i; if occupied but no match, try i+1, i+2, etc.

linear-probing hash table

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]	P	M			A	C	S	H	L		E				R	X

M = 16

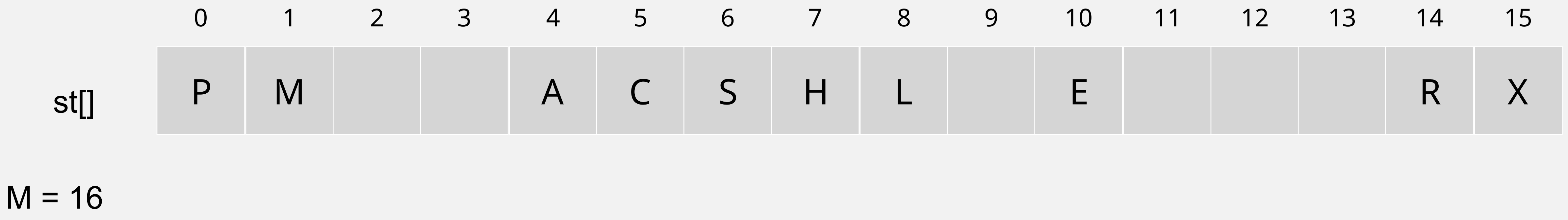
Linear-probing hash table demo: search

Hash. Map key to integer i between 0 and M-1.

Search. Search table index i; if occupied but no match, try i+1, i+2, etc.

search E

hash(E) = 10



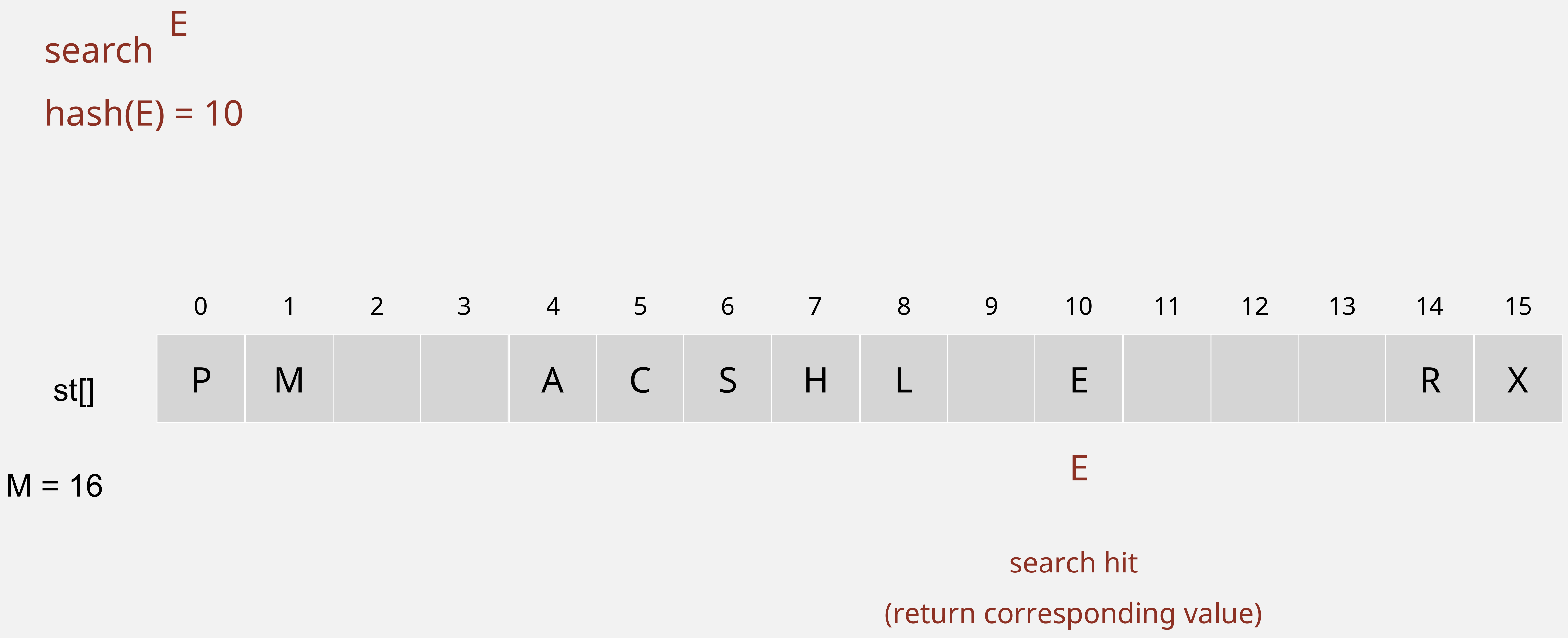
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]	P	M			A	C	S	H	L		E				R	X

M = 16

Linear-probing hash table demo: search

Hash. Map key to integer i between 0 and M-1.

Search. Search table index i; if occupied but no match, try i+1, i+2, etc.



search E

hash(E) = 10

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]	P	M			A	C	S	H	L		E				R	X

M = 16

E

search hit

(return corresponding value)

Linear-probing hash table demo: search

Hash. Map key to integer i between 0 and M-1.

Search. Search table index i; if occupied but no match, try i+1, i+2, etc.

linear-probing hash table

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]	P	M			A	C	S	H	L		E				R	X

M = 16

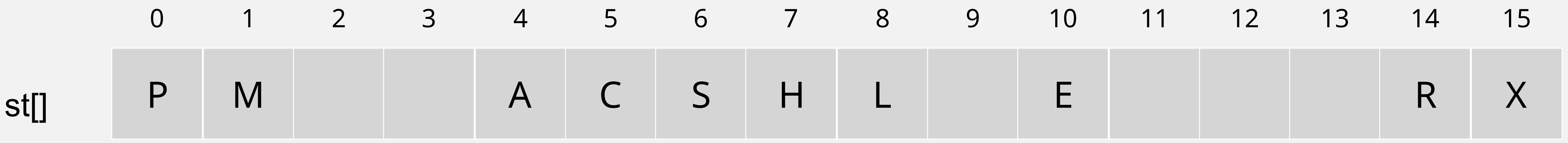
Linear-probing hash table demo: search

Hash. Map key to integer i between 0 and M-1.

Search. Search table index i; if occupied but no match, try i+1, i+2, etc.

search L

hash(L) = 6



	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]	P	M			A	C	S	H	L		E				R	X

M = 16

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st[]	P	M			A	C	S	H	L		E				R	X
							L									

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st[]	P	M			A	C	S	H	L		E				R	X
								L								

M = 16

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st[]	P	M			A	C	S	H	L		E				R	X
									L							

M = 16

search hit

(return corresponding value)

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linear-probing hash table

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st[]	P	M			A	C	S	H	L		E				R	X

M = 16

Linear-probing hash table demo: search

Hash. Map key to integer i between 0 and M-1.

Search. Search table index i; if occupied but no match, try i+1, i+2, etc.

search K

hash(K) = 5

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]	P	M			A	C	S	H	L		E				R	X

M = 16

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						K										

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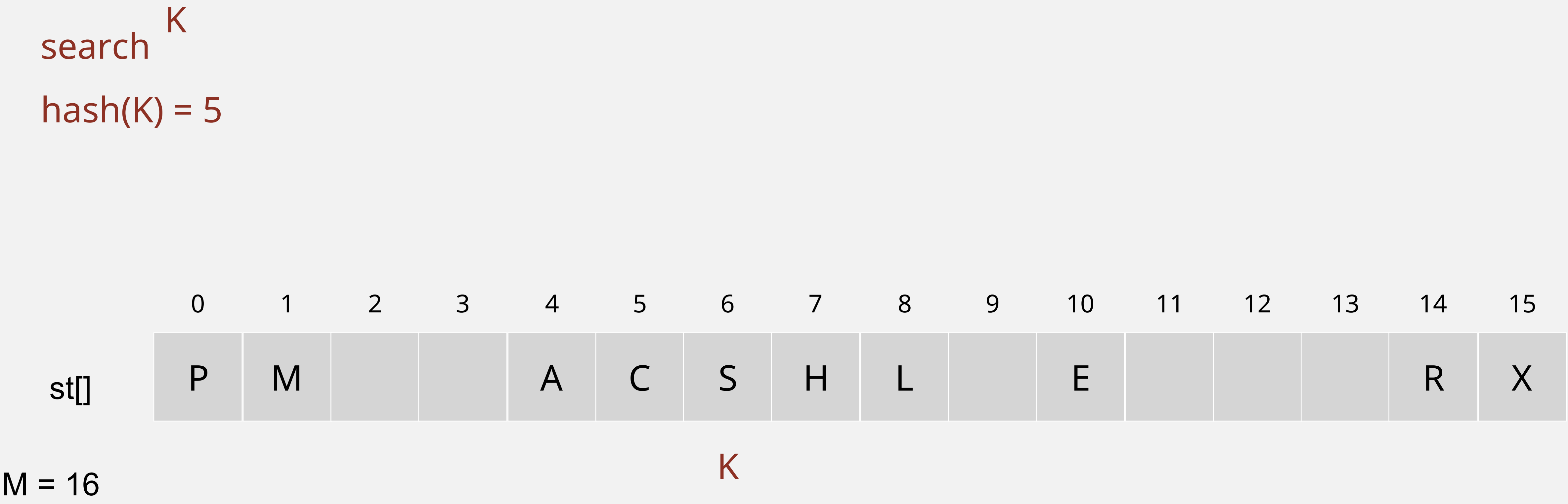

search K

hash(K) = 5

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]	P	M			A	C	S	H	L		E				R	X
							K									

M = 16

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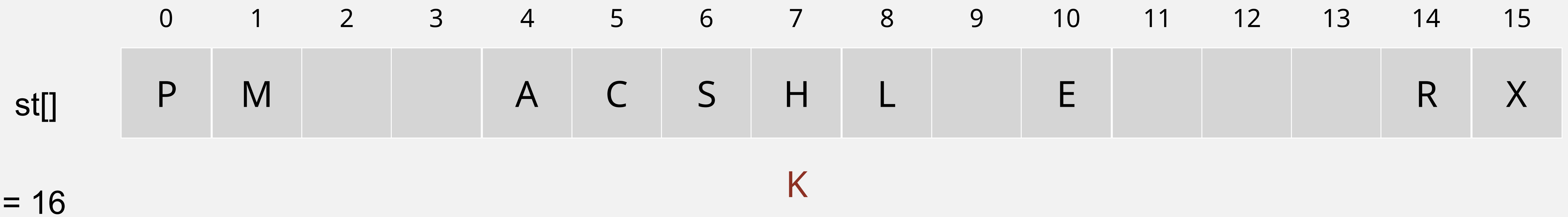
search K

hash(K) = 5



	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]	P	M			A	C	S	H	L		E				R	X
								K								

M = 16

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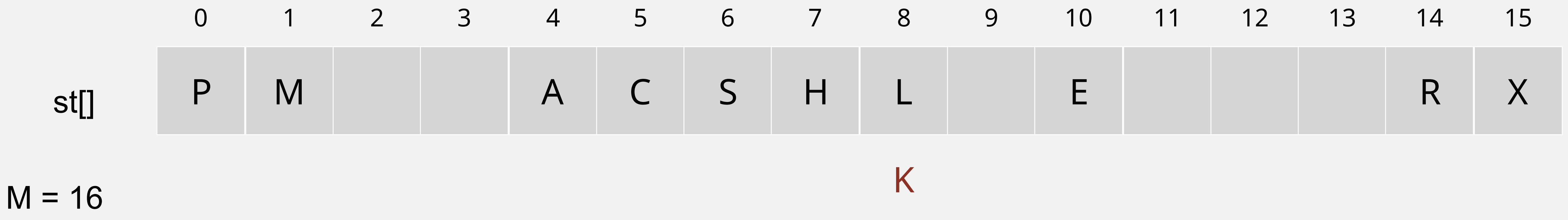
Search. Search table index i; if occupied but no match, try i+1, i+2, etc.

search K

hash(K) = 5



	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]	P	M			A	C	S	H	L		E				R	X
									K							

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	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
st[]	P	M			A	C	S	H	L		E				R	X
										K						

M = 16

search miss

(return null)