In the root node, the green player has a full hand, but the blue player has a completely empty hand

Root node

3/4

1/2 — Incomplete-hand node

1/2   0/1   0/1 — Full-hand node

0/1   1/1 — Incomplete-hand node

In the root node, the green player has a full hand, but the blue player has a completely empty hand

Transition to an incomplete-hand-node by making a move

Root node

3/4

1/2

Incomplete-hand node

1/2

0/1

0/1

Full-hand node

0/1

1/1

Incomplete-hand node

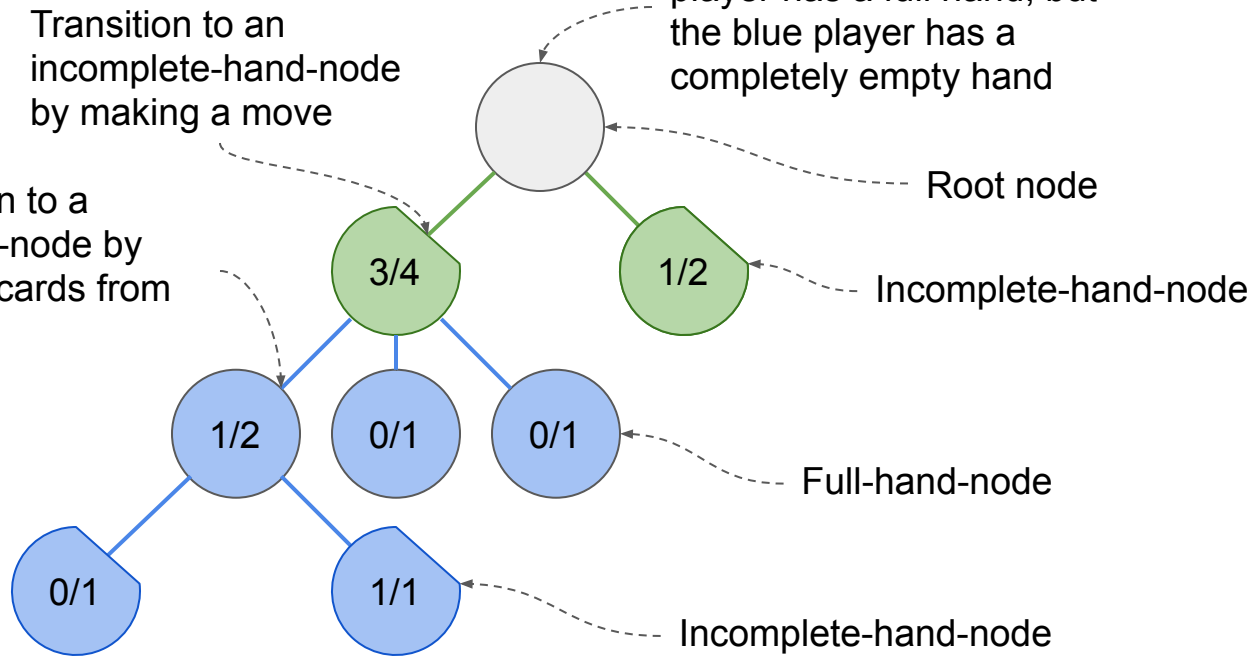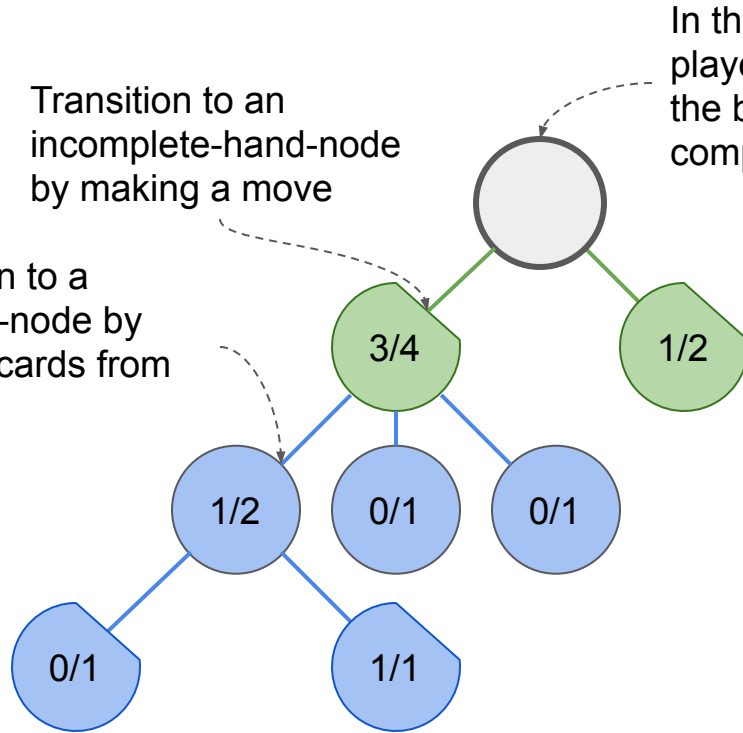In the root node, the green player has a full hand, but the blue player has a completely empty hand

Transition to an incomplete-hand-node by making a move

Transition to a full-hand-node by drawing cards from the deck

Root node

3/4

1/2

Incomplete-hand-node

1/2

0/1

0/1

Full-hand-node

0/1

1/1

Incomplete-hand-node

In the root node, the green player has a full hand, but the blue player has a completely empty hand

Transition to an incomplete-hand-node by making a move

Transition to a full-hand-node by drawing cards from the deck

3/4

1/2

1/2

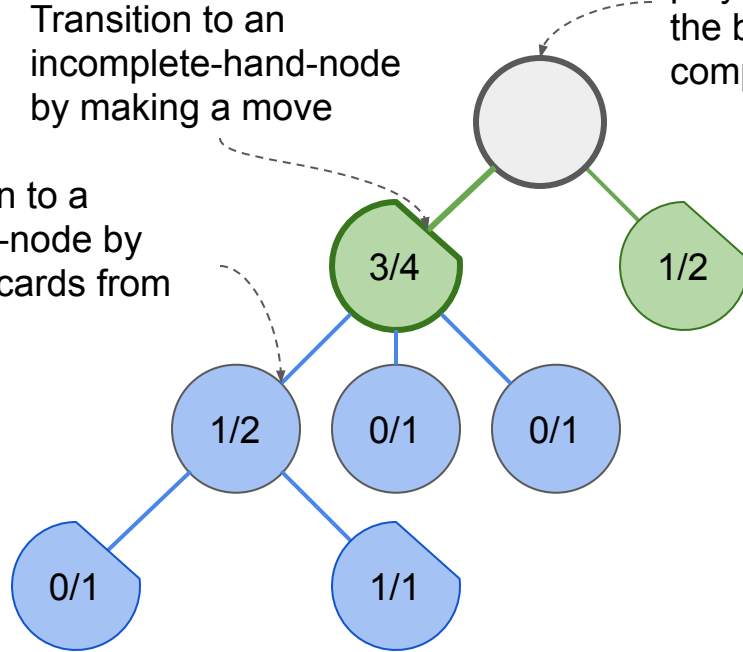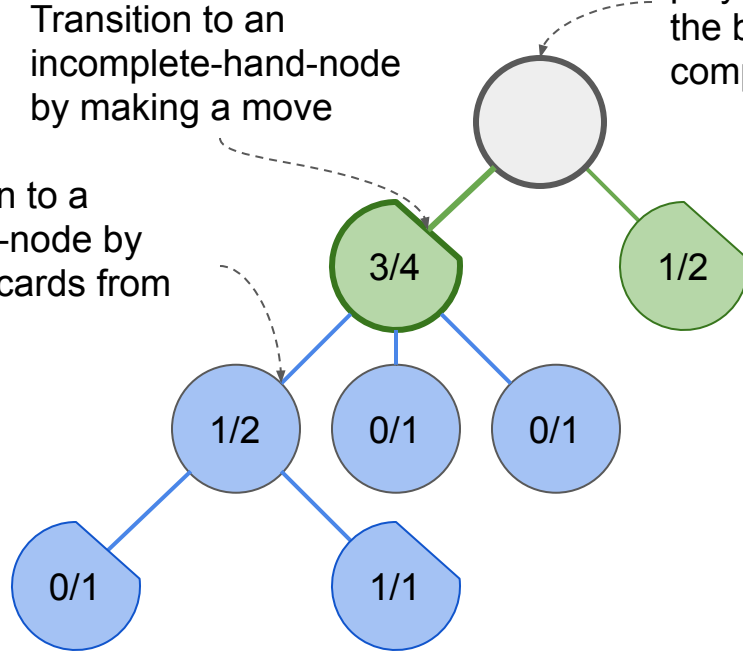0/1

0/1

0/1

1/1

SELECTION

Select the action/child node with the highest UCB

Select a deck draw/child node randomly, proportional to the probability the deck draw

Transition to an incomplete-hand-node by making a move

In the root node, the green player has a full hand, but the blue player has a completely empty hand

Transition to a full-hand-node by drawing cards from the deck

SELECTION

Select the action/child node with the highest UCB

Select a deck draw/child node randomly, proportional to the probability the deck draw

3/4

1/2

1/2

0/1

0/1

0/1

1/1

Transition to an incomplete-hand-node by making a move

In the root node, the green player has a full hand, but the blue player has a completely empty hand

Transition to a full-hand-node by drawing cards from the deck
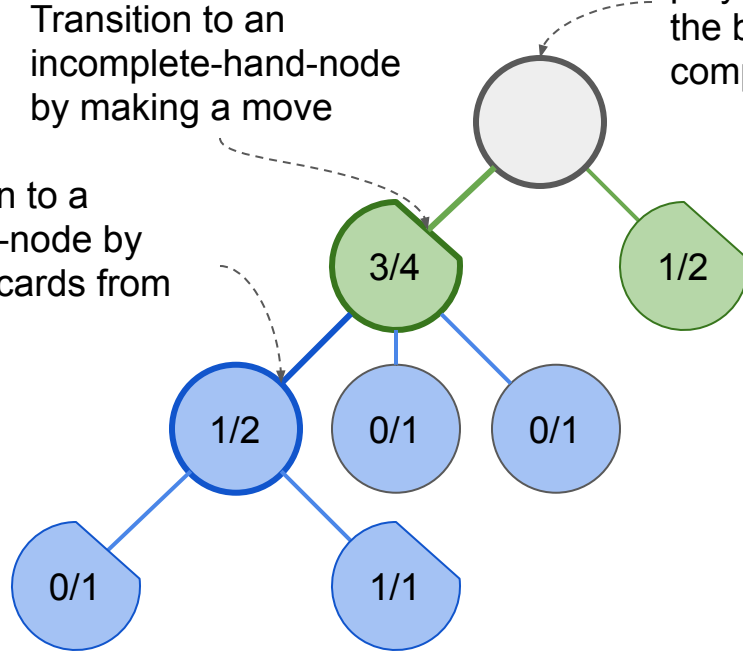
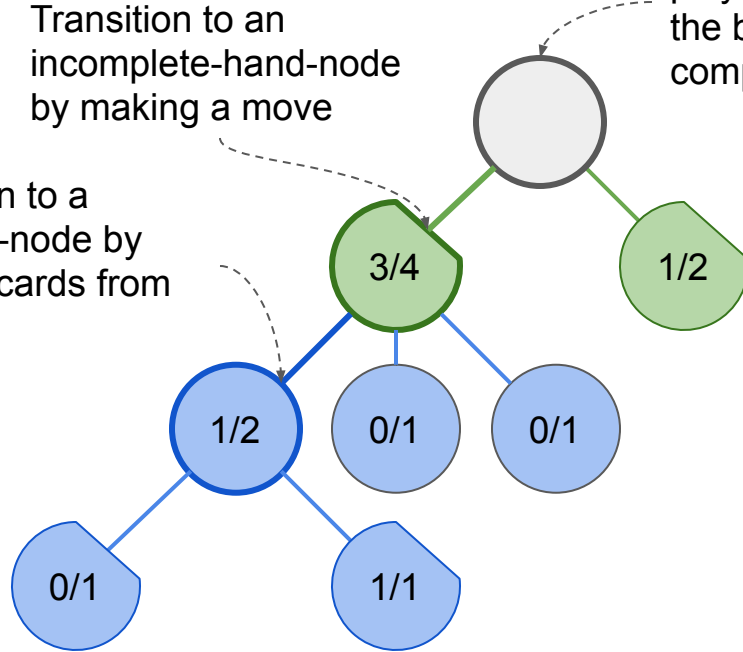**SELECTION**

Select the action/child node with the highest UCB

Select a deck draw/child node randomly, proportional to the probability the deck draw

Transition to an
incomplete-hand-node
by making a move

In the root node, the green
player has a full hand, but
the blue player has a
completely empty hand

Transition to a
full-hand-node by
drawing cards from
the deck

3/4

1/2

1/2

0/1

0/1

0/1

1/1

SELECTION

Select the action/child node with
the highest UCB

Select a deck draw/child node
randomly, proportional to the
probability the deck draw

Transition to an incomplete-hand-node by making a move

Transition to a full-hand-node by drawing cards from the deck

In the root node, the green player has a full hand, but the blue player has a completely empty hand

3/4

1/2

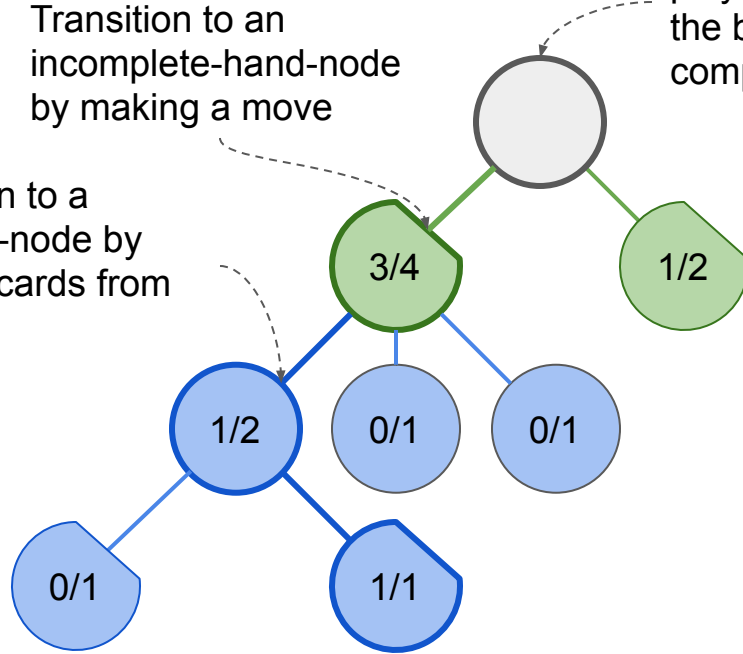1/2

0/1

0/1

0/1

1/1

SELECTION

Select the action/child node with the highest UCB

Select a deck draw/child node randomly, proportional to the probability the deck draw

Transition to an
incomplete-hand-node
by making a move

In the root node, the green
player has a full hand, but
the blue player has a
completely empty hand

Transition to a
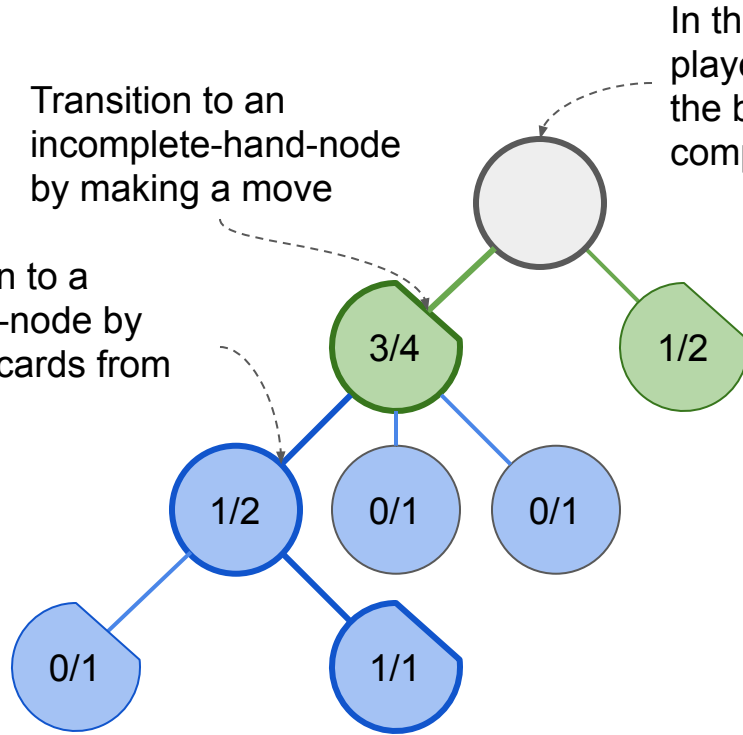full-hand-node by
drawing cards from
the deck

3/4

1/2

1/2

0/1

0/1

0/1

1/1

SELECTION

Select the action/child node with
the highest UCB

Select a deck draw/child node
randomly, proportional to the
probability the deck draw

Transition to an incomplete-hand-node by making a move

Transition to a full-hand-node by drawing cards from the deck

In the root node, the green player has a full hand, but the blue player has a completely empty hand

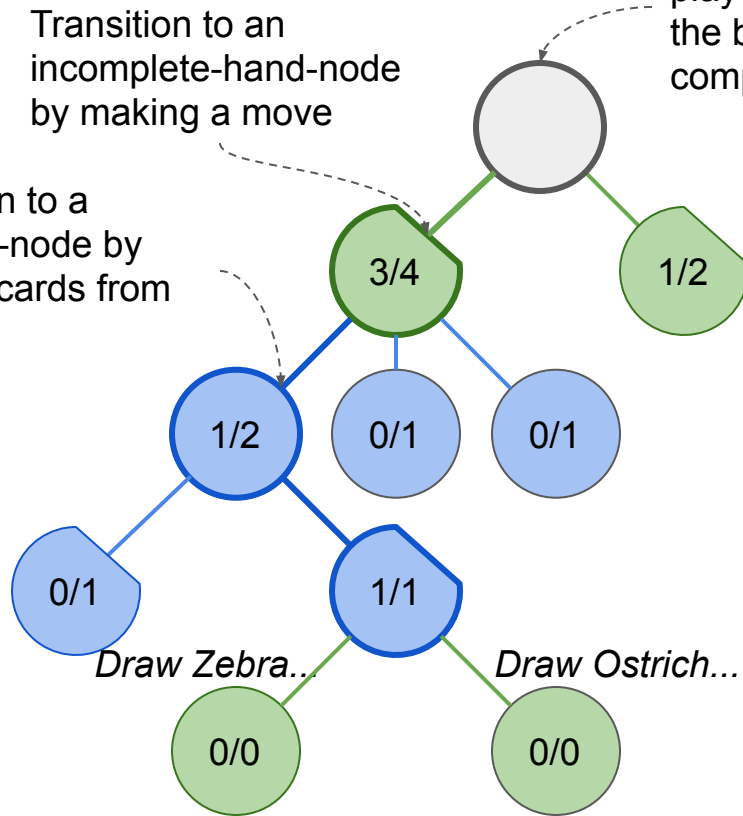**EXPANSION**

Find what child nodes this node can have based on:

For an incomplete-hand node:
　　　Possible deck draws

For a complete-hand node:
　　　Possible moves

Transition to an incomplete-hand-node by making a move

In the root node, the green player has a full hand, but the blue player has a completely empty hand

Transition to a full-hand-node by drawing cards from the deck

3/4

1/2

1/2

0/1

0/1

0/1

1/1

Draw Zebra...

Draw Ostrich...

0/0

0/0

EXPANSION

Find what child nodes this node can have based on:
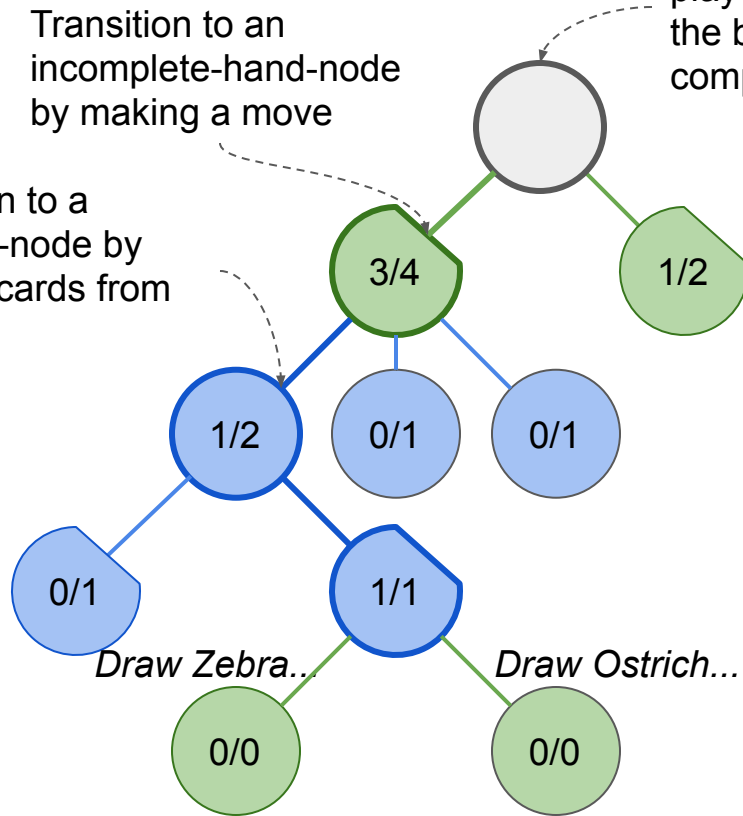
For an incomplete-hand node:
        Possible deck draws

For a complete-hand node:
        Possible moves

Transition to an incomplete-hand-node by making a move

Transition to a full-hand-node by drawing cards from the deck

In the root node, the green player has a full hand, but the blue player has a completely empty hand

SIMULATION

For the newly sprouted leaf node, simulate a 'random game', and record who wins.

3/4

1/2

1/2   0/1   0/1

0/1   1/1

Draw Zebra...   *Draw Ostrich...*

0/0   0/0

Transition to an incomplete-hand-node by making a move

Transition to a full-hand-node by drawing cards from the deck

In the root node, the green player has a full hand, but the blue player has a completely empty hand
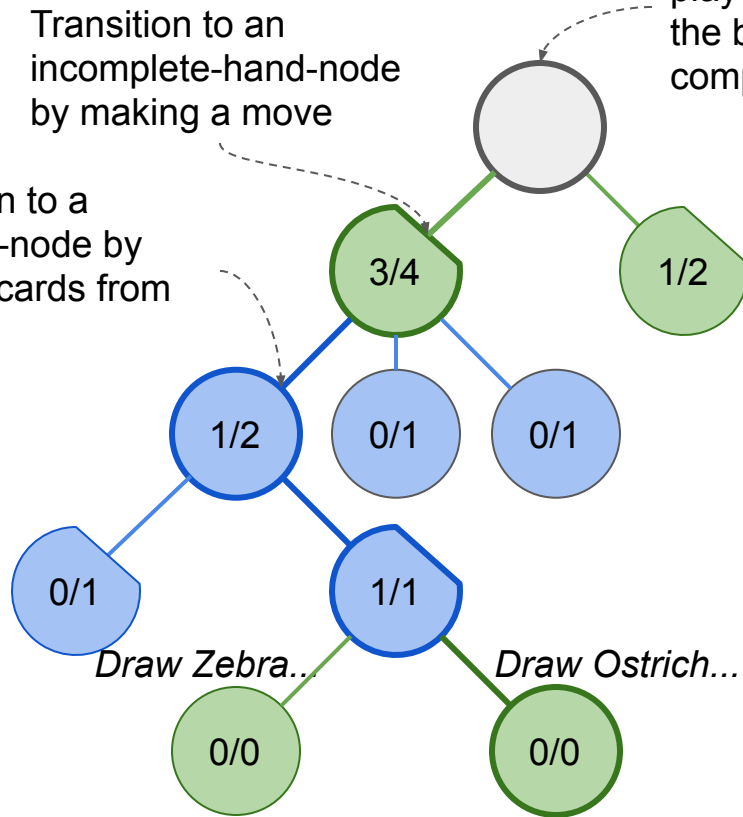
3/4

1/2

1/2

0/1

0/1

0/1

1/1

Draw Zebra...

Draw Ostrich...

0/0

0/0

SIMULATION

For the newly sprouted leaf node, simulate a 'random game', and record who wins.

Transition to an incomplete-hand-node by making a move

Transition to a full-hand-node by drawing cards from the deck

In the root node, the green player has a full hand, but the blue player has a completely empty hand
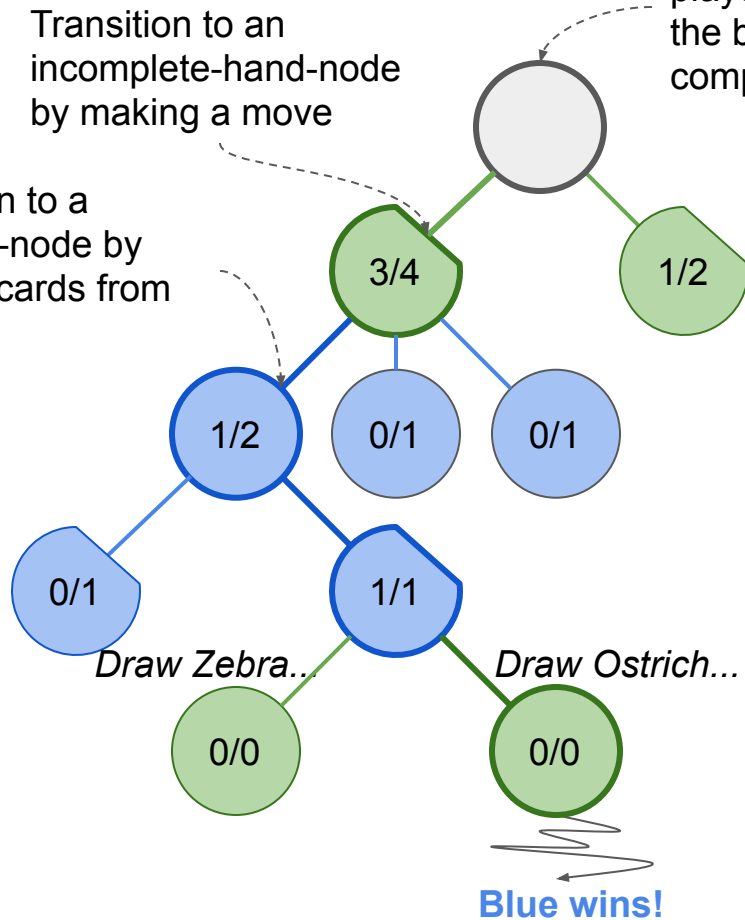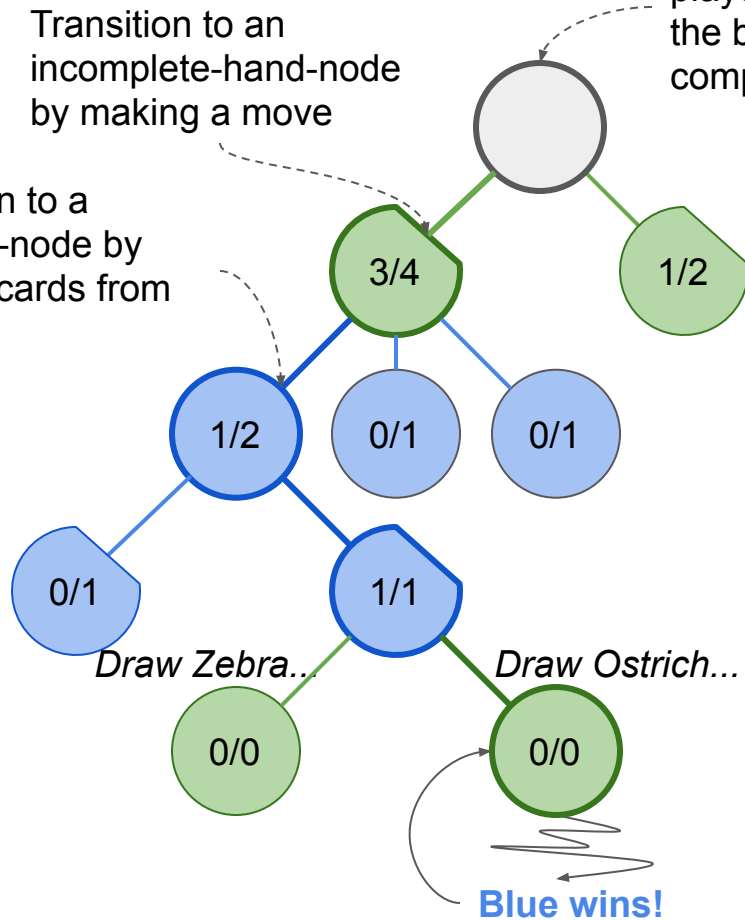
3/4

1/2

1/2   0/1   0/1

0/1   1/1

Draw Zebra...   *Draw Ostrich...*

0/0   0/0

Blue wins!

SIMULATION

For the newly sprouted leaf node, simulate a 'random game', and record who wins.

Transition to an incomplete-hand-node by making a move

In the root node, the green player has a full hand, but the blue player has a completely empty hand

Transition to a full-hand-node by drawing cards from the deck

BACKPROPAGATION

Update the win/lose statistics of the leaf node and all its ancestors

3/4

1/2

1/2

0/1

0/1

0/1

1/1

Draw Zebra...

Draw Ostrich...

0/0

0/0

Blue wins!

Transition to an incomplete-hand-node by making a move

In the root node, the green player has a full hand, but the blue player has a completely empty hand

Transition to a full-hand-node by drawing cards from the deck

BACKPROPAGATION

Update the win/lose statistics of the leaf node and all its ancestors

3/4

1/2

1/2

0/1

0/1

0/1

1/1

0/1

Draw Zebra...

0/0

Draw Ostrich...

0/1 **:(**

Blue wins!

Transition to an incomplete-hand-node by making a move

In the root node, the green player has a full hand, but the blue player has a completely empty hand

Transition to a full-hand-node by drawing cards from the deck

BACKPROPAGATION

Update the win/lose statistics of the leaf node <u>and all its ancestors</u>

3/4

1/2

1/2   0/1   0/1

0/1   1/1

Draw Zebra...   *Draw Ostrich...*

0/0   0/1

Blue wins!

Transition to an incomplete-hand-node by making a move

Transition to a full-hand-node by drawing cards from the deck

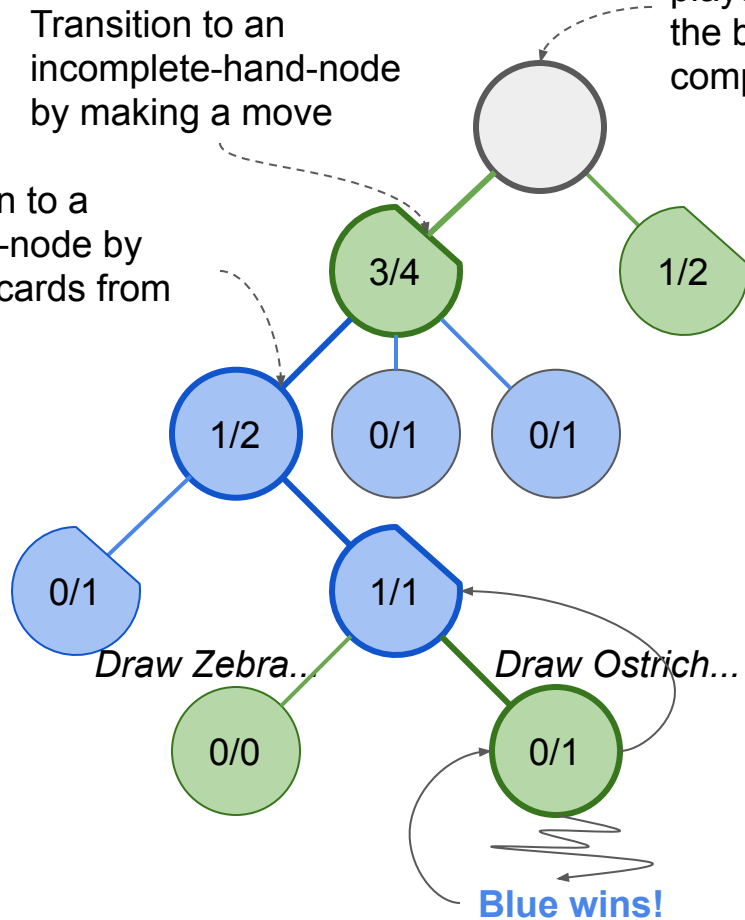In the root node, the green player has a full hand, but the blue player has a completely empty hand
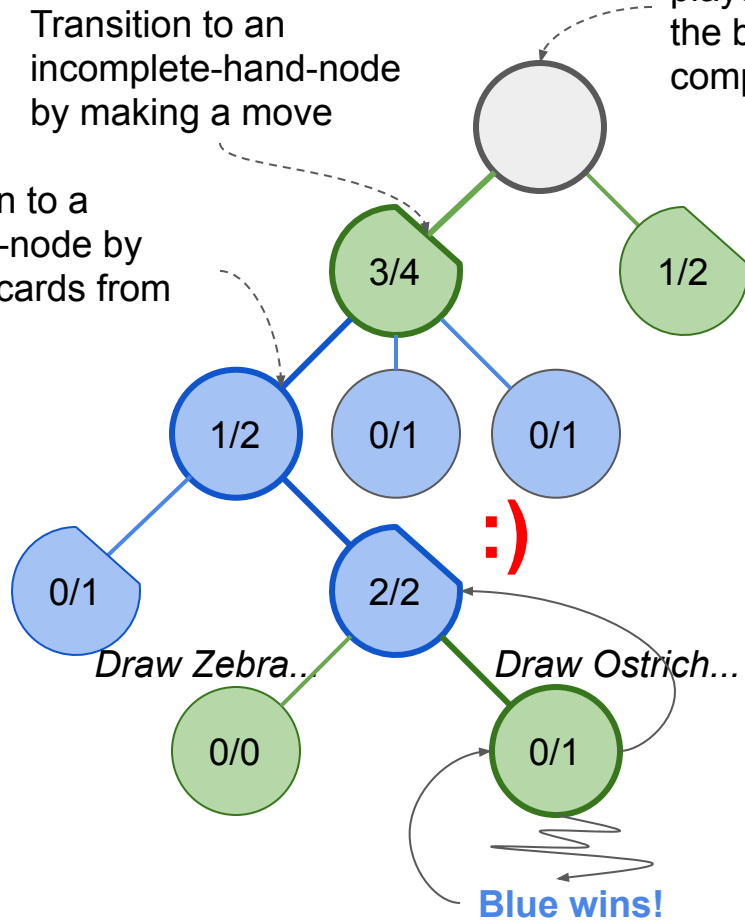
BACKPROPAGATION

Update the win/lose statistics of the leaf node <u>and all its ancestors</u>

3/4

1/2

1/2

0/1

0/1

:)

0/1

2/2

Draw Zebra...

Draw Ostrich...

0/0

0/1

Blue wins!

Transition to an incomplete-hand-node by making a move

Transition to a full-hand-node by drawing cards from the deck

In the root node, the green player has a full hand, but the blue player has a completely empty hand

BACKPROPAGATION

Update the win/lose statistics of the leaf node and all its ancestors

3/4

1/2

1/2

0/1

0/1

0/1

2/2

Draw Zebra...

Draw Ostrich...

0/0

0/1

Blue wins!

Transition to an incomplete-hand-node by making a move

In the root node, the green player has a full hand, but the blue player has a completely empty hand

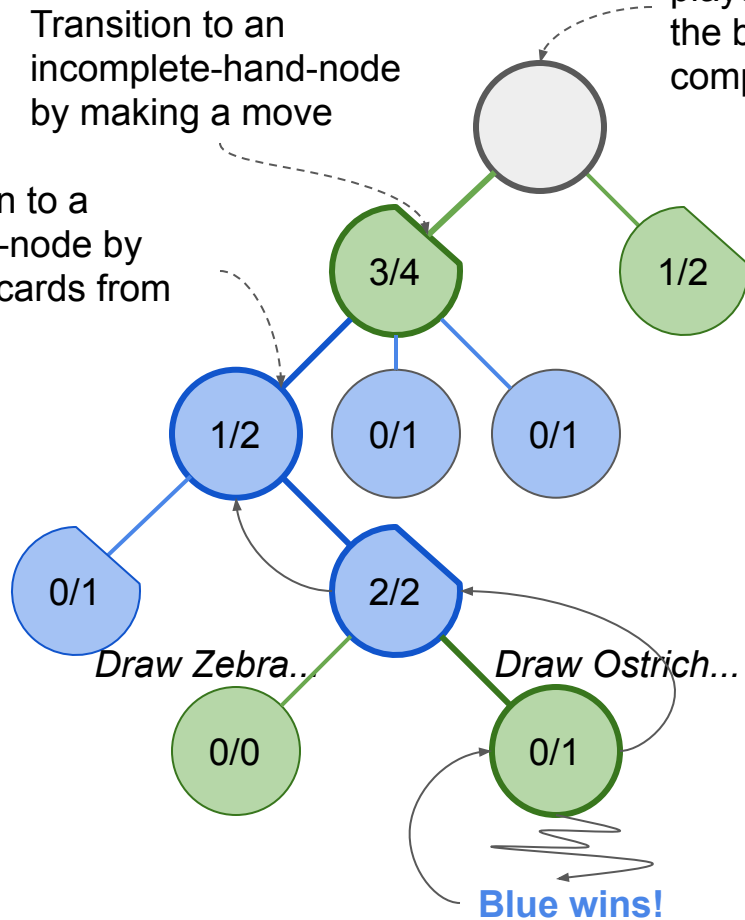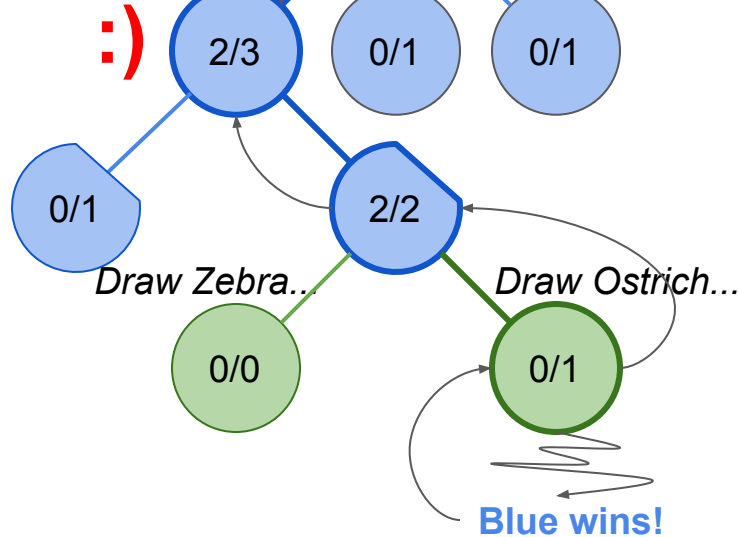Transition to a full-hand-node by drawing cards from the deck

BACKPROPAGATION

Update the win/lose statistics of the leaf node <u>and all its ancestors</u>

:)

3/4   1/2

2/3   0/1   0/1

0/1   2/2

Draw Zebra...   *Draw Ostrich...*

0/0   0/1

Blue wins!

Transition to an
incomplete-hand-node
by making a move

In the root node, the green
player has a full hand, but
the blue player has a
completely empty hand

BACKPROPAGATION
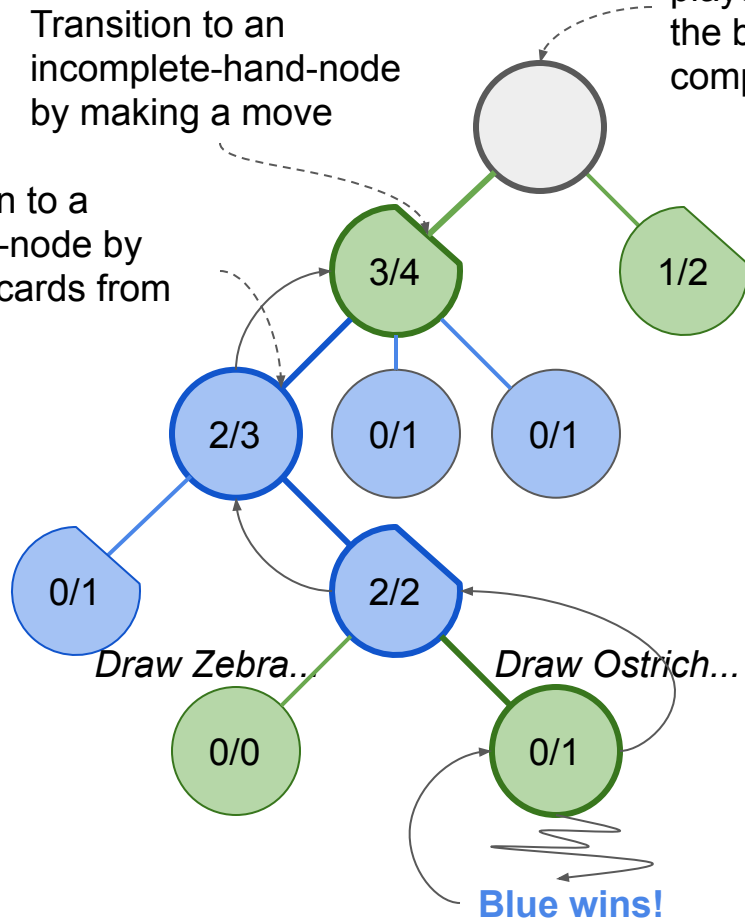
Transition to a
full-hand-node by
drawing cards from
the deck

Update the win/lose statistics of the
leaf node <u>and all its ancestors</u>

3/4

1/2

2/3

0/1

0/1

0/1

2/2

Draw Zebra...

Draw Ostrich...

0/0

0/1

Blue wins!

Transition to an incomplete-hand-node by making a move

In the root node, the green player has a full hand, but the blue player has a completely empty hand

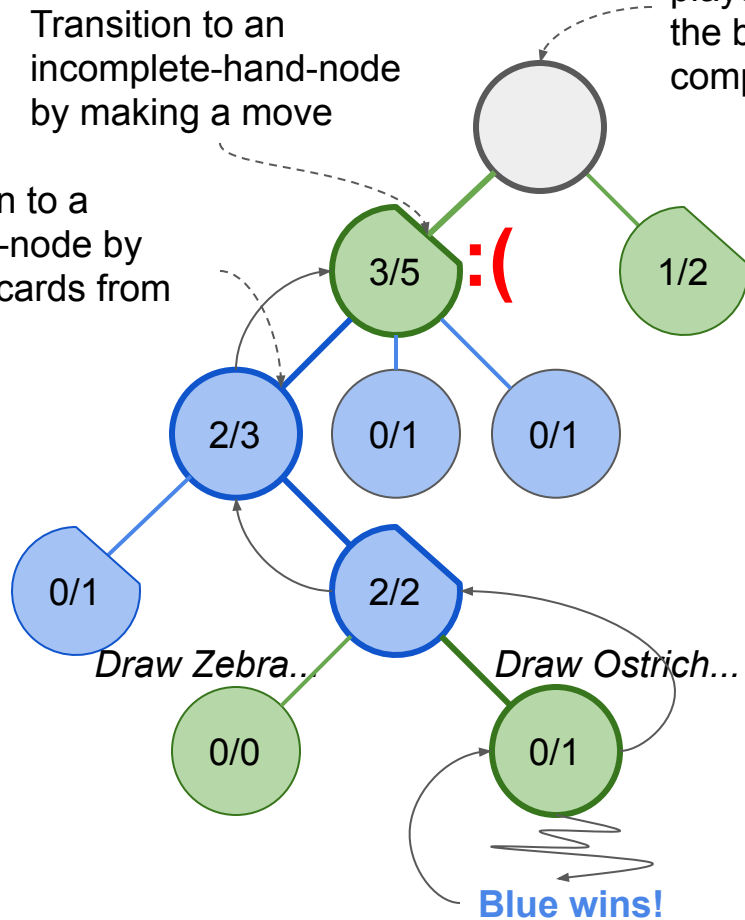Transition to a full-hand-node by drawing cards from the deck

BACKPROPAGATION

Update the win/lose statistics of the leaf node <u>and all its ancestors</u>

3/5 :(

1/2

2/3

0/1

0/1

0/1

2/2

Draw Zebra...

Draw Ostrich...

0/0

0/1

Blue wins!

Transition to an incomplete-hand-node by making a move

Transition to a full-hand-node by drawing cards from the deck

In the root node, the green player has a full hand, but the blue player has a completely empty hand

REPEAT!

3/5

1/2

2/3   0/1   0/1

0/1   2/2

Draw Zebra...   *Draw Ostrich...*

0/0   0/1