$S \rightarrow SS \rightarrow L = D_i S \rightarrow a = D_i S \rightarrow$
\[a = 2_i S \rightarrow a = 2_i L = L_i \rightarrow a = 2_i b = L_i \rightarrow \]
\[a = 2_i b = a_i \]
We start in the start state
We don't have a choice: to get to f, we push $ and go to state i.

Stack    $    $
Again no choice we push $S$
stack $S$

$S$
The first rule we use was $S \rightarrow SS$, so we pop $S$, push $S$, then go to $a_1$, push $S$ again.
Now, we use the rule $S' \rightarrow L = D i$
Now, we use the rule 
\[ \varepsilon, L \rightarrow \alpha \]
Terminal symbol $a$ is on top of stack, the only way to delete it is to use rule $a, a \rightarrow \varepsilon$
Terminal symbol = on top of stack so we use the rule $i = \rightarrow \epsilon$
We use the rule $D \rightarrow 2$
Two terminal symbols on top of stack, so we use rules $2, 2 \rightarrow \varepsilon$ and $i, i \rightarrow \varepsilon$.
Now, we use the rule
\[ S \rightarrow L = L_i \]
We use rule $L \rightarrow b$
Terminal symbols on top of stack, so we use rules:

\[
\begin{align*}
\text{\$} & \rightarrow \text{\$} \\
\text{\$} & \rightarrow \text{\$}
\end{align*}
\]
Terminal symbols on top of stack, so we use rules
\[ a_i, a \rightarrow \epsilon \]
\[ i, i \rightarrow \epsilon \]
We finished reading all symbols, so we go to \( f \). We are in \( f \) with empty stack, so the word is accepted.
Graphical description of all transitions:

| read | $ | i | w | a_1 | w | a_2 | a_3 | ay | W | W | W | W | W | W | a = 2 |
|------|---|---|---|-----|---|-----|-----|---|---|---|---|---|---|---|---|------|
| state | S | i | w | a_1 | W | a_2 | a_3 | ay | W | W | W | W | W | W | W | W |
| stack | $ | S | $ | S | S | $ | S | S | $ | D | D | D | L | a | = | D | i | s | s | $ |

<table>
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<th>a_6</th>
<th>a_7</th>
<th>W</th>
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<th>a</th>
<th>i</th>
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<tbody>
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<tr>
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</tbody>
</table>

Where $ represents the start symbol and $ represents the accept symbol.