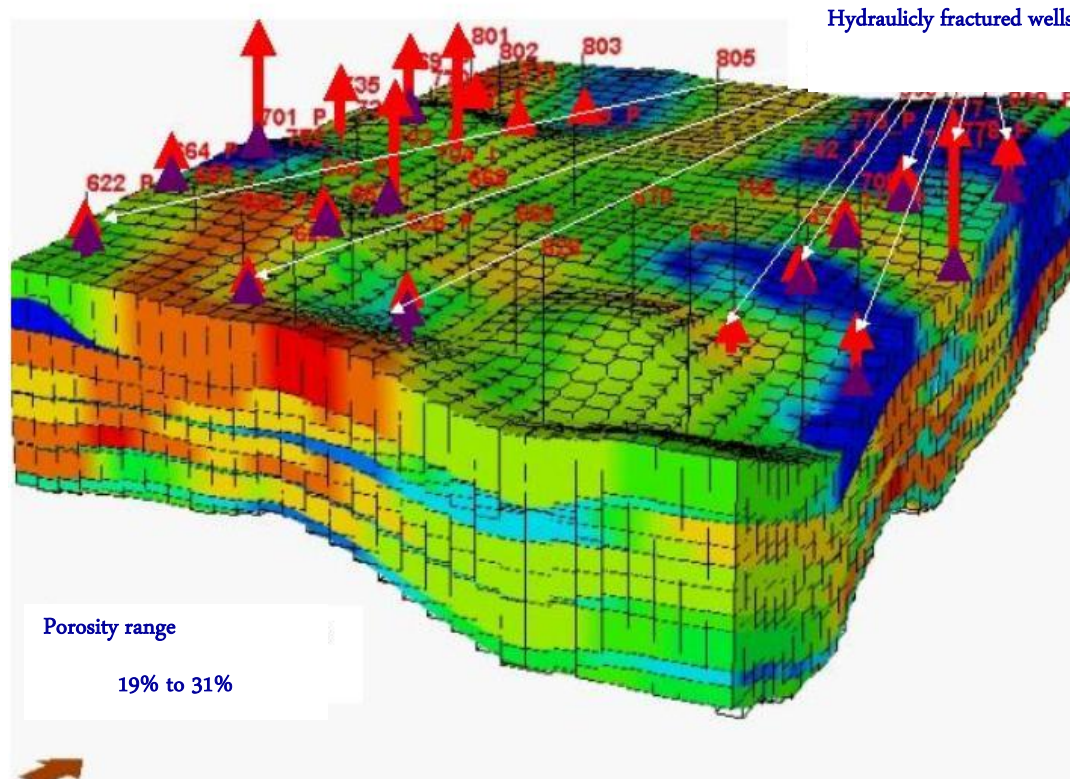


Birth of a reservoir



The life of a reservoir began when the earth was young and continues today

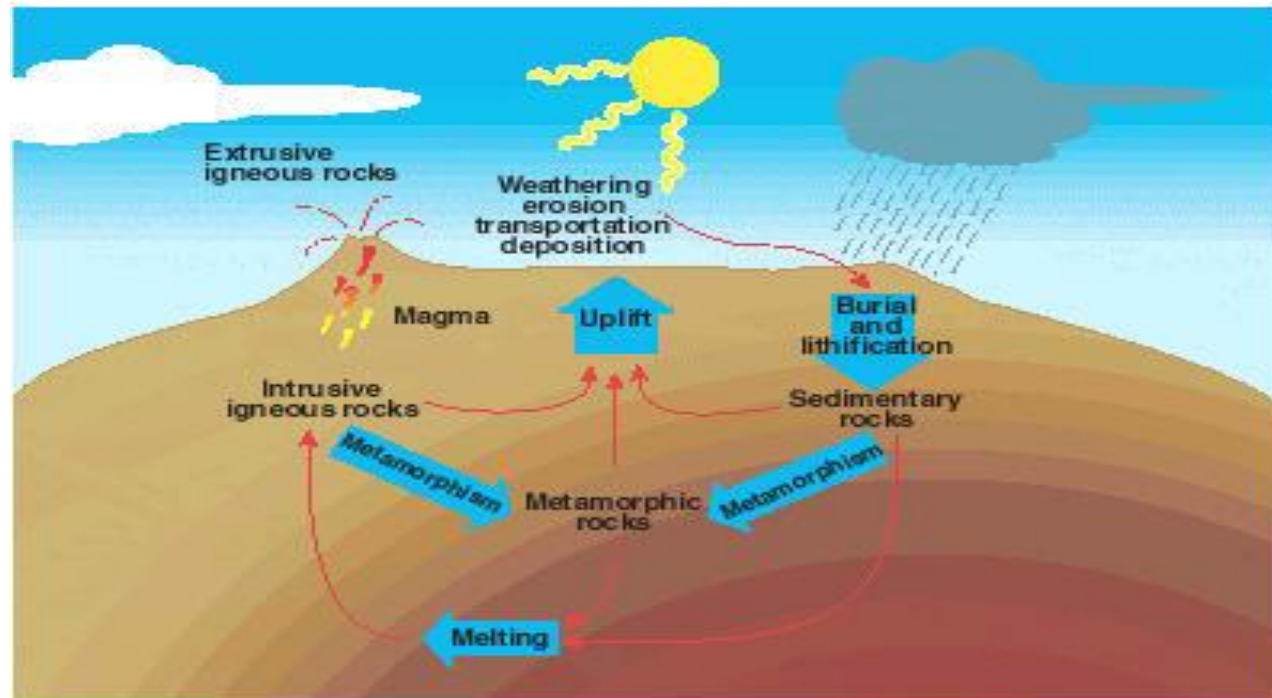
300 million years ago



Schlumberger, Making of Oil

The creation of an oil reservoir begins with the movement of continents over millions of years. At the example of the North Sea, here marked red, the area was once positioned close to the equator and slowly moved northwards over thousands of km.

The driving force



The earth's crust, only 8 to 40 km thin, is constantly affected by the move of the earth's mantle (2,900 km thick). Huge forces drive continents apart, push mountains together and on-top of each other, lower land below sea level and cause volcanic eruptions.

200 million years ago



Schlumberger, Making of Oil

Millions of years ago the North Sea was just a shallow valley near the equator filled with warm and very salty water; it was very rich in organic organism.

100 million years ago



Schlumberger, Making of Oil

On its long travel north, the North Sea became a shallow sea, then a swamp, later a desert and again a sea.

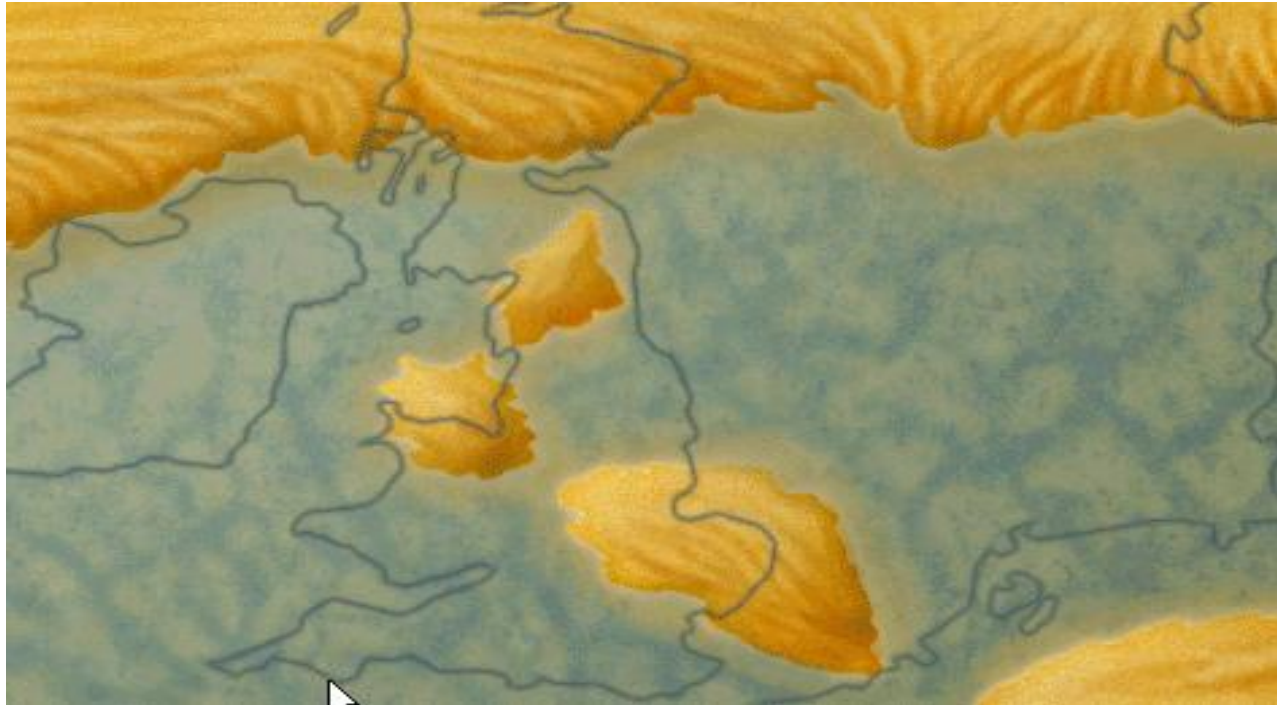
Today



Schlumberger, Making of Oil

Flooded water produced organic matter that later became oil.
The North Sea still subsides today and collects organic matter.

The North Sea 300 million years ago



Schlumberger, Making of Oil

A close look at the North Sea on its migration north over millions of years shows many changes. Shallow waters, shown in light blue, were rich in organic matter.

200 million years ago



Schlumberger, Making of Oil

When the sea subsided to deeper waters, shown in dark blue, layers of shale and sediments laid down on the organic deposits and sealed them off from oxygen contact.

100 million years ago



Schlumberger, Making of Oil

When the region of today's North Sea became a desert, great sand dunes collected on top of the shale, formed sand stones that would later hold the oil.

North Sea today

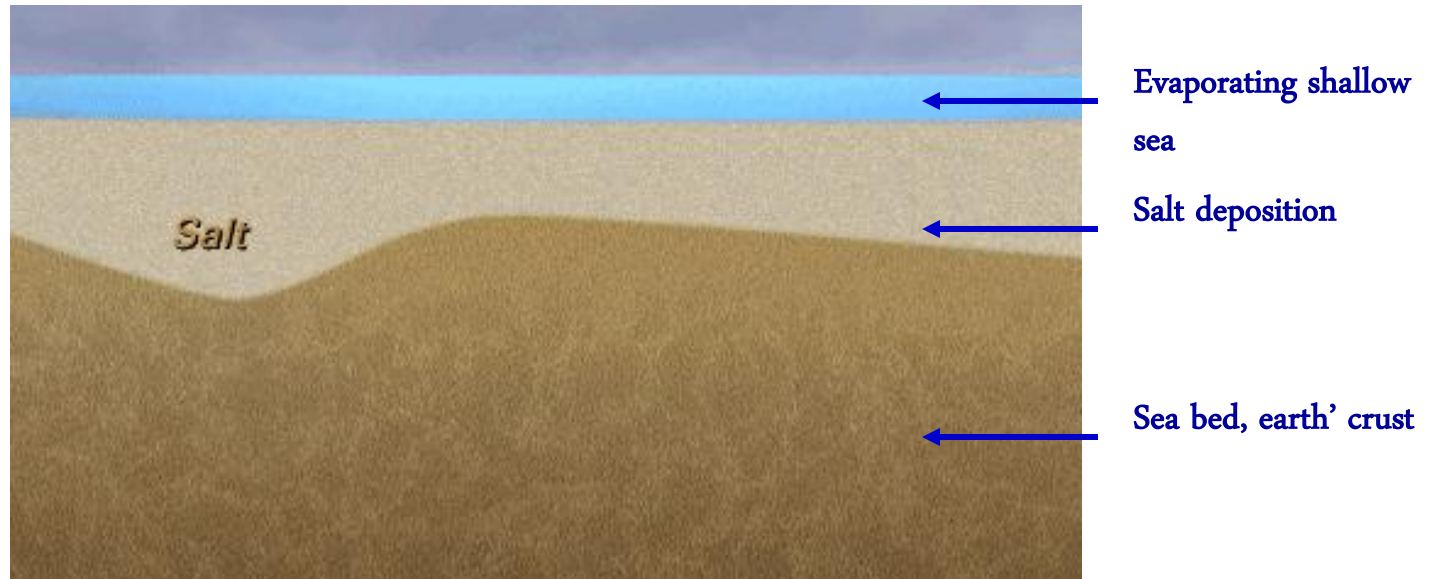


Schlumberger, Making of Oil

Today's North Sea has a water depth of approx. 100m and holds oil and gas reservoirs at depth of 1,500 m to 4,500 m.

Today there are more than 150 oil fields from the Netherlands to the Shetland islands.

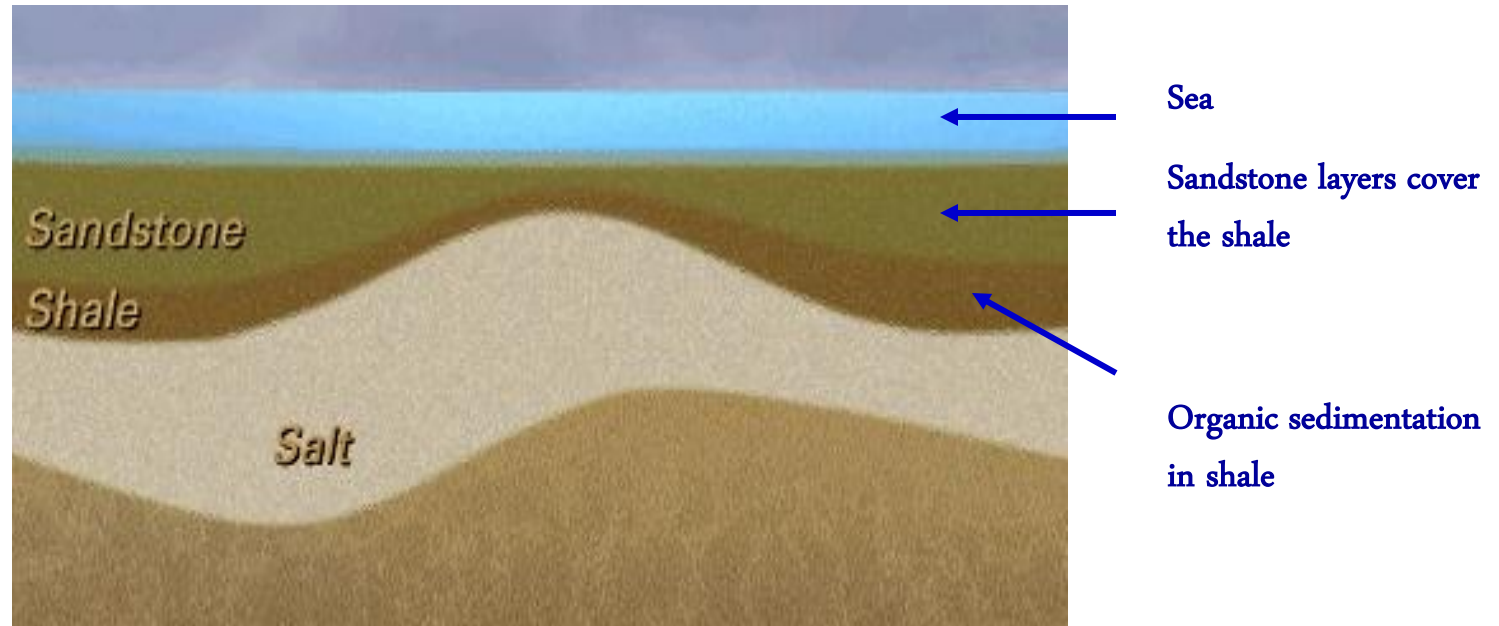
Depositions 300 million years ago



Schlumberger, Making of Oil

Shallow and warm sea water evaporated close to the equator and left a thick layer of salt on the sea bed.

200 million years ago



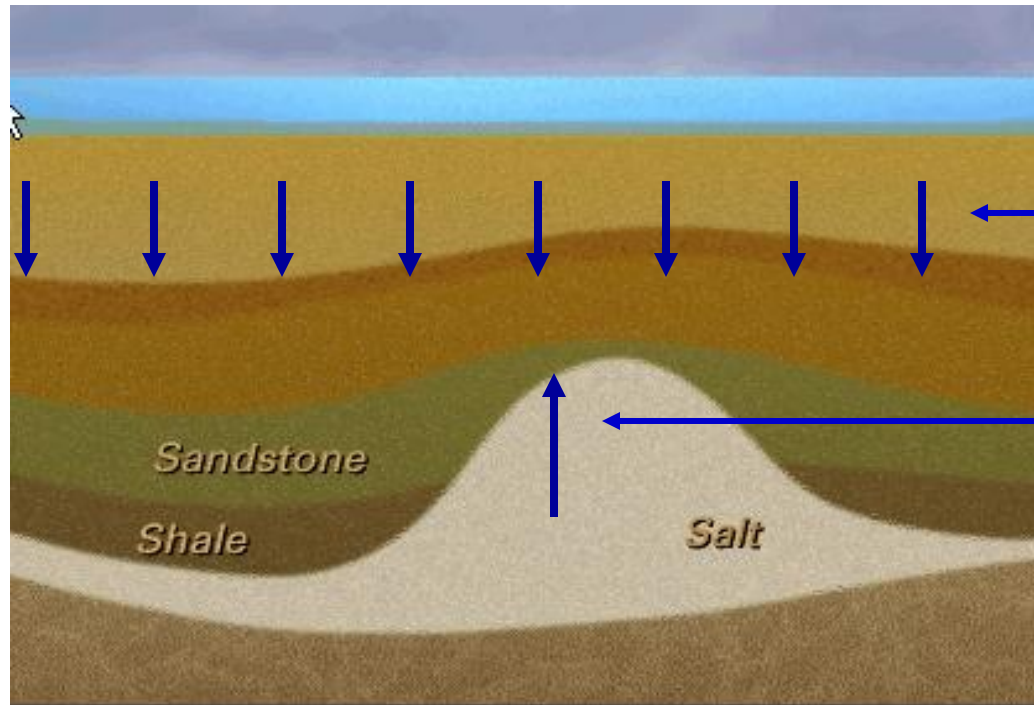
Schlumberger, Making of Oil

The sea bed sank and organic rich shale was deposited over the salt and covered by a thick layer of sandstone.

With temperature and time the shale became the source for oil and gas - called source rock. Oil and gas migrated upwards.

The sandstone on top of the shale became the reservoir collecting the infiltrating oil.

100 million years ago

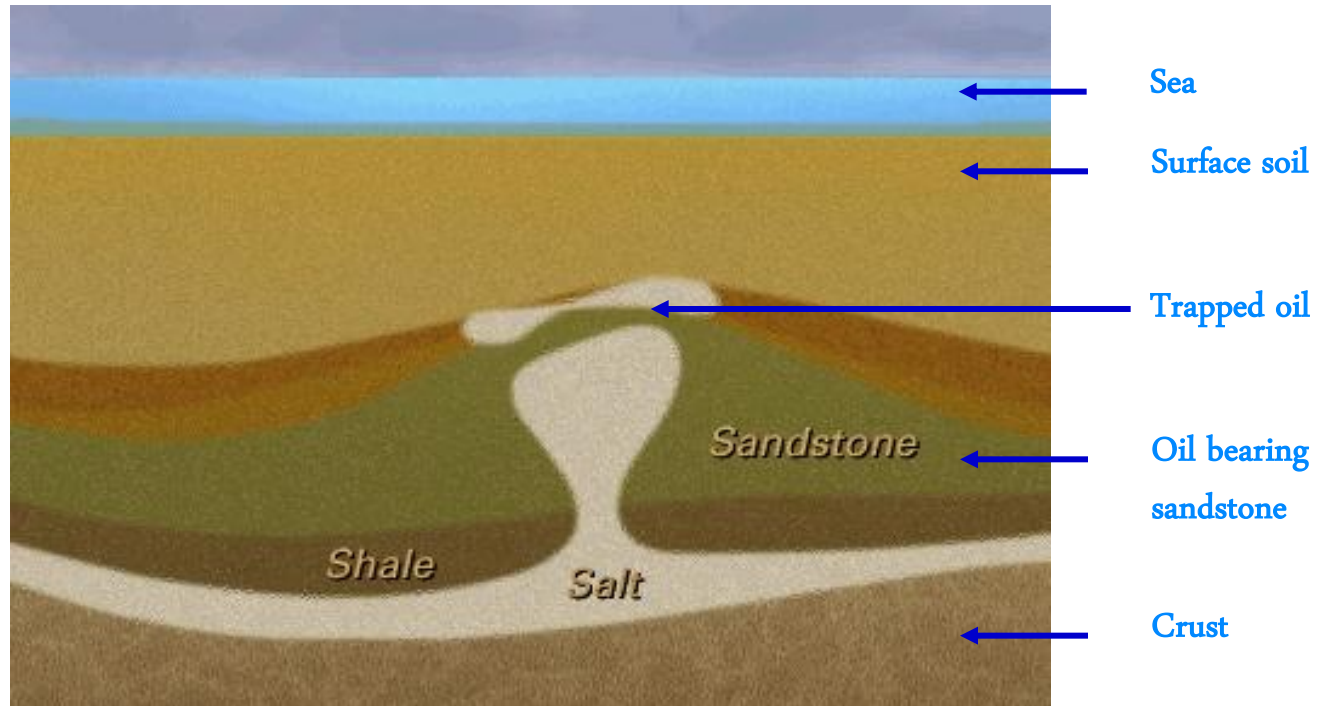


Schlumberger, Making of Oil

The horizontal layers of salt are under the enormous pressure of the overlying sandstone and sea.

The malleable salt is squeezed upwards to form a salt dome many hundred meters high.

Birth of a reservoir today



Schlumberger, Making of Oil

The salt mushroomed to a dome and it trapped the oil in the sandstone under the tight blankets of salt.

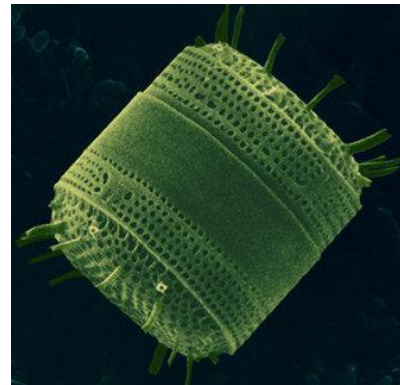
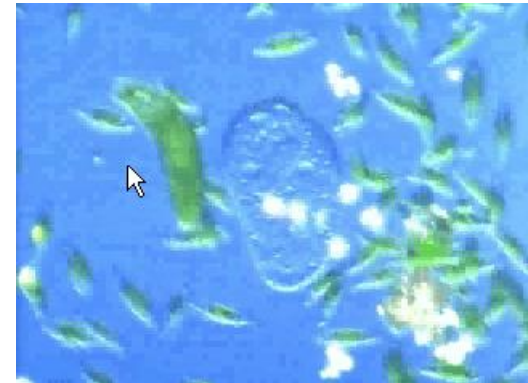
This small portion of trapped oil became a reservoir.

Now, it just had to be found and exploited!

Plankton, source of oil and gas

Already some 60 - 500 million years ago shallow seas were rich in organic organisms like **micro organism** , **algae** and **proteins** known as **plankton**.

Plankton is microscopic, usually single celled, floating in water and are both plants and animals.



When plankton, algae and proteins die they fall to the bottom and are deposited on the sea bed.

Organic development

Organic deposits start to “cook” when they are covered with sediments and reach a temperature of 50 - 70°C



Schlumberger, Making of Oil

In due **time**, given enough **pressure** and **heat** once living creatures were transferred to petroleum by a complicated chemical process and migrate upwards to the reservoir.

Shells in the desert



Libya, 1986, RB

Petrified shells and maritime animals can be found in the middle of deserts, here in the Sahara - South Libya and on mountain summits. Showing that at one time there was a living sea.

Summery

The oil and natural gas we use today have their origins in prehistoric times, when tiny plants and animals lived in the sea. When those creatures died, they sank into layers of mud and sand. When the earth's crust buckled, these fossilised remains were subjected to intense pressure and heat that, over time, converted them into hydrocarbons, the primary components of oil and natural gas.

Hydrocarbons – natural chemical compounds based on hydrogen and carbon – are a remarkable source of energy. When the bonds holding the hydrogen and carbon molecules together are broken, usually under heat, the energy that went into the bond is released. Machines such as generators, boilers and engines harness this released energy to create useful power.

Although small amounts of oil and natural gas can be found close to the surface, most deposits are located deep under the surface. That's why the oil and gas industry employs increasingly sophisticated technology and environmentally sound methods to reach these underground hydrocarbon deposits and recover and process them for your use.



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